

THE IRON AGE

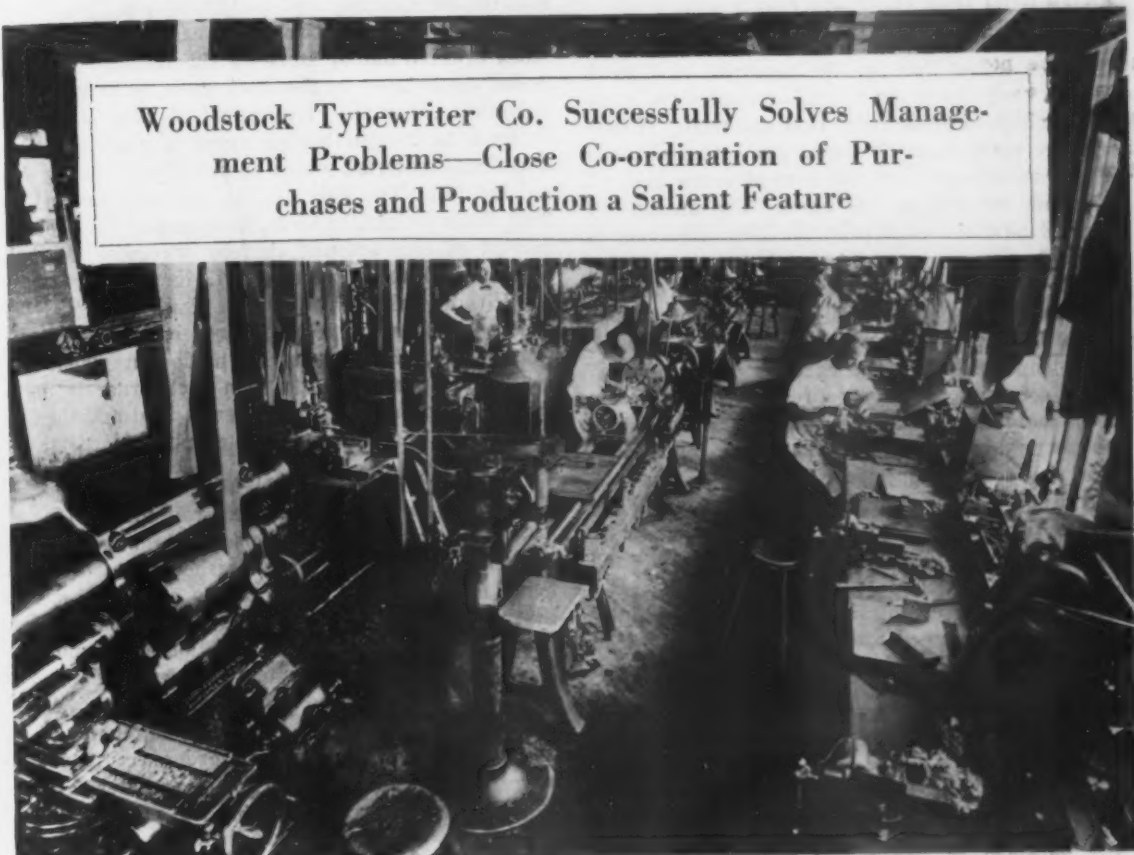
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Control of Raw Material to Suit Output

Woodstock Typewriter Co. Successfully Solves Management Problems—Close Co-ordination of Purchases and Production a Salient Feature



BY GILBERT L. LACHER*

CONTROLLING raw material stocks has an importance now generally recognized. Those manufacturers who did not give this feature of management due attention had it forcibly thrust upon them late in 1920 when inventory values dropped suddenly and large stocks were transformed from assets into liabilities. The prevention of losses resulting from quick changes in market condition, essential as it is, is not, however, the sole reason for keeping down raw material supplies. In certain lines of manufacture, where the finished product is undergoing almost continuous change, owing to the development of improvements in design, excessive stocks prove a handicap to the extent that a new design calls for different materials than were contained in the older product. This consideration is potent in the typewriter field and perhaps explains why so much attention has been given the subject of raw material control by the Woodstock Typewriter Co., Woodstock, Ill. In a similar manner,

the regulation of stocks of finished products and the management of the production department itself show the results of a thorough study of the problems attending typewriter manufacture.

This company, employing 500, is not large compared with such mammoth institutions as have grown up in the steel or automotive industries, which consume great quantities of materials. Its product, however, is one consisting of such a multiplicity of different parts as to make proper regulation of raw material stocks more complex than in many larger industries. There are 1400 pieces in the Woodstock typewriter and, allowing for the use of several of the same pieces in a single machine, there are still 600 absolutely different parts. To maintain a minimum supply of materials for these parts, without running the risk of exhausting the stocks and thereby interrupting plant operation, was a problem which called for the creation of a practicable system, founded on accurate records of production in relation to the consumption of materials.

Materials going into a typewriter fall into three main classes: gray iron castings, strip steel and screw

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The illustration at the head of this page depicts the tool room of the plant, with benches located where they get adequate light.

rod. A typical inventory would show in stock about 85,000 lb. of screw stock, 90,000 lb. of strip steel and 18,000 lb. of castings. In the purchasing department a careful record is kept of the amount of each material in store, requisitions by the plant and purchases of additional material. This applies not only to the three main classes mentioned, but also to every other material that goes into the typewriter, including purchased finished parts, such as key rings, and semi-finished parts, such as wood cores for platens, and likewise to manufacturing supplies used in the factory, purchased small tools and to office supplies, such as stationery, etc. The records are kept on what are termed "raw stock cards," on which are indicated the minimum amounts of the materials used which should be kept in stock. In other words, the purchasing agent makes it his business to place additional orders before the stock on hand falls below the safety line.

Control of Raw Materials

It is to be noted that on the separate raw stock card kept for each size of material is recorded the typewriter part which is made from that material. If several parts are made from the same size material, as is sometimes true, especially in the case of screw rod, all such parts are entered on the card. The amount of steel required to make each part for 1000 machines is also recorded.

At the top of the card is entered the total amount of that particular size of steel required for 10,000 typewriters, for the part or parts for which it is used. This figure is recorded on the card as a "minimum," although it does not actually represent the minimum amount of material which the company proposes to carry, but is analogous to a list price on a commodity. To obtain the actual minimum, this figure must be multiplied by a certain percentage which will vary according to three factors: (1) rate of production by the factory in typewriters per day; (2) time required for obtaining this material from the steel mills; (3) the possibility of governing inventories so carefully that orders may be lumped to secure a carload instead of a less-than-carload freight rate, thereby effecting a saving.

Information for the rate of production must be estimated and is based on the sales department's survey of prospective business. The time which must be allowed for delivery of materials depends largely on market conditions: in dull periods mill shipments are sometimes obtained in two weeks, whereas at other times deliveries may take ten or twelve weeks. Together with the matter of mill deliveries is considered the trend of steel prices. In a rising market it is advantageous to buy heavily, while in a declining market the incentive is to hold back purchases as much as possible. Speculation as to the course of prices, however, must never permit stocks to drop down to a day's or even a week's supply, thereby incurring the danger of stopping factory operations for lack of material.

Necessity for keeping stocks above the danger point is also a prime consideration when lumping orders to get the benefit of the carload rate. In connection with screw rod, which is used in a great variety of sizes, ranging from 1/16 in. in diameter to 1 1/2 in., it has been found that the larger sizes are easier to get from the mill than the smaller ones. The sizes used by the plant, therefore, have been divided accordingly into two main groups. In the case of the smaller sizes, much more time is allowed for the receipt of new shipments than for the other class. In the case of strip steel the same group principle has been applied, except that, owing to the nature of typewriter construction, the sizes form three groups, one of which is easier to get than the other two.

The raw stock card shown in Fig. 1 is typical of those kept by the company. The number of entries,

however, has been limited so that the purport of the card can be easily grasped by the reader. This card contains the record for round 1/2-in. screw rod, from which four different parts and eight separate pieces are made for each Woodstock typewriter. After each part number are recorded the number of parts used in each typewriter and the weight in pounds of screw rod for 1000 parts. To secure the weight of screw rod required for 1000 typewriters, the weight per part is multiplied by the number of parts per machine. Thus, the weight of steel used to make 1000 pieces of part No. R-317 is 24.6 lb. As two of these parts are used in each typewriter, 24.6 lb. is doubled to secure the weight per 1000 machines, or 49.2 lb. In this manner the weight of all the parts made from 1/2-in. screw stock is computed and the total weight per 1000 machines is finally multiplied by 10 to secure the "minimum" amount, or that required for 10,000 machines.

It will be noted from the card that, on Dec. 27, stock ordered out of store by the factory, 1067 lb., reduced the balance in the stock room to 1336 lb., or considerably below the "minimum" of 2249 lb. This was a signal to the purchasing agent to place an order for additional material, which he did, 2000 lb. being ordered on Jan. 13. On Feb. 13 the material arrived, being 2065 lb. in weight, or 65 lb. in excess of the order. The receipt of this amount thereby increased the balance then remaining in store to 2612 lb.

Withdrawals of material from store are easily checked with stock room records by means of production orders, which must be made out whenever any typewriter part is made. On each order is indicated the name and size of the material used and the amount required to make a specified number of parts.

How Finished Material Is Controlled

The care used in controlling raw material supply is no greater than that exercised in regulating finished material stocks. For each finished part also a "minimum" is established which serves a purpose similar to that of the minima for the various sizes of raw material. With the latter, the function of the minimum is to enable the purchasing agent to determine when new orders should be placed to replenish store room stocks; in the case of finished parts the minimum indicates when the factory should be ordered to make more pieces. Like the minimum for raw material, that for finished parts is a list figure. The minimum recorded on the finished stock card shown in Fig. 2 is 8000 pieces. The factors affecting this figure are the number of typewriters assembled in the plant per day and the time required to make a new lot of the part. In this case it is estimated that 8000 pieces form a safe balance to have in stock for a production of 100 typewriters per day. As two of these parts go into each typewriter, this means a stock sufficient for 4000 machines, or 40 working days.

By referring to the card it will be noted that on Jan. 3 the balance of parts in stock had dropped to 2260. That the need for additional parts had been anticipated is indicated by the fact that on Dec. 8 an order for 10,000 pieces had been given to the factory. On Jan. 26 this order had been completed and 9430 pieces were added to the balance, bringing the total up to 11,690 in stock. Requisitions from stock by the assembling department on Feb. 3, March 6, March 27, April 10 and April 26 again reduced the balance to 1690. On April 29, however, another order, placed March 6, was completed by the factory and the balance in stock was swelled to 11,070.

As a check on the balance shown on the card, a perpetual inventory is kept in the store room. Ordinarily the difference, if any, between the computed balance and the inventory is small and is ascribable to the handling of the pieces on scales which weigh in terms of pieces, thus eliminating the necessity for

RAW STOCK CARD

Maximum Amount of Stock: 2000
Minimum Amount of Stock: 200
Total Weight Per 1000 MACH. 11.25

ORDERED		IN		OUT		BALANCE		PIECE PARTS USED ON	
DATE	AMOUNT	DATE	AMOUNT	DATE	AMOUNT	DATE	AMOUNT	DATE	AMOUNT
1-15-2000		2-13-2005		10-25	69	404110-15	2672	8-317	2
				12-27	1,867	404110-25	2603	8-79	2
				1-1	625	520612-27	1336	2044	3
				2-5	163	30371-17	710	1-506	1
				6-5	672	2692-3	947		
				8-4	297	40182-15	2812		
						6-6	1300		
						3-4	1643		

- 1—An Accurate Record of Material on Hand, Withdrawals and Replenishments Is Kept on Raw Stock Cards
- 2—A Record Is Kept of the Stock of Each Finished Typewriter Part on Hand, Withdrawals for Assembly and Manufacturing Orders
- 3—For Each Typewriter Part an Operations Card Records the Kind and Amount of Material Required and the Various Operations and Time Allowances Necessary

FINISHED STOCK CARD

Part No. C-88
NAME: CARRIAGE SHIFT LINK COLLAR
Max. Amount in Stock: ALL
Min. Amount in Stock: 5,000

ORDERED		IN		OUT		BALANCE		
DATE	AMOUNT	DATE	AMOUNT	DATE	AMOUNT	DATE	AMOUNT	
12-5	10,000	1-26	5350	2-3	1062	2000	1-5	2,260
3-6	10,000	4-29	6192	5-3	1829	2000	1-26	11,690
				6-10	2192	2000	2-3	9,690
				6-25	2308	2000	2-5	7,690
							2-27	5,690
							4-10	3,690
							4-29	11,690

COST AND SCHEDULE SHEET

ORDER NO. 7000

NAME: Carriage Shift Link Collar
PART NO. C-88
DATE ORDERED: 9/10/22
PIECES ORDERED: 10,000

OPER. NO.	1	2	3	4	5	6	7	8	9	10
OPER. NAME	AUTOMATIC	BURR	MILL FLAT	CASE HARDEN	BURNISH-LATHE					
DATE	8-24	9-25	9-25	9-25	9-25					
PC.	1140	2096	2096	2096	2096					
COST	485.9									
NO.										
DATE	8-24	9-25	9-25	9-25	9-25					
PC.										
COST										
NO.										

MATERIAL REQUIRED

PRODUCTION ORDER NO. 7000
PART NO. C-88
KIND: ROUND SCREW RD
SIZE: .375"
DATE ORDERED: 10/22
AMOUNT: 10,000
AMOUNT: 1128

Op. No.	Op. Desc.	Operation Name	Mat. Time	Clk. Time	Time to Finish	Units Produced	Op. No.	Op. Desc.	Operation Name	Mat. Time	Clk. Time	Time to Finish	Units Produced
1	3	AUTOMATIC	13	45	10	9-6	9-8	11	BURR				
2	11	BURR				9-8	9-11	1	MILL FLAT				
3	1	MILL FLAT				9-11	9-12	9	CASE HARDEN IN SPH				
4	9	CASE HARDEN IN SPH				9-12	9-14	53	BURNISH ON LATHE				
5	53	BURNISH ON LATHE											

375 C. D. Round Steel 11.25#
C-88 Carriage Shift Link Collar - 2

Op. No.	Op. Desc.	Operation Name	Mat. Time	Clk. Time	Time to Finish	Units Produced
1	3	AUTOMATIC				
2	11	BURR				
3	1	MILL FLAT				
4	9	CASE HARDEN IN SPH				
5	53	BURNISH ON LATHE				

- 4—To Obtain His Pay Each Workman Must Fill Out a Schedule Card, Showing the Details of the Job He Has Done. The card shown is filled out by a piece-work employee
- 5—From the Workmen's Schedule Cards a Record Is Kept of the Progress of Each Production Order on a Cost-and-Schedule Sheet. By this means it can be ascertained whether work is falling seriously behind schedule
- 6—A Production Order Is Issued Every Time Material Is Put Through the Production Department. All departments affected are indicated, as is the scheduled time for the work
- 7—The Foreman of the First Department to Work on a Given Production Order Is Given a Material Requisition Which Enables Him to Obtain Required Stock from Store

MATERIAL REQUISITION

DATE: 8-10-22
ORDER NO. 7000
PART NO. C-88
KIND: ROUND SCREW RD
SIZE: .375"
DATE ORDERED: 10/22
AMOUNT: 10,000
AMOUNT: 1128

11.25# .375" Screw Rd

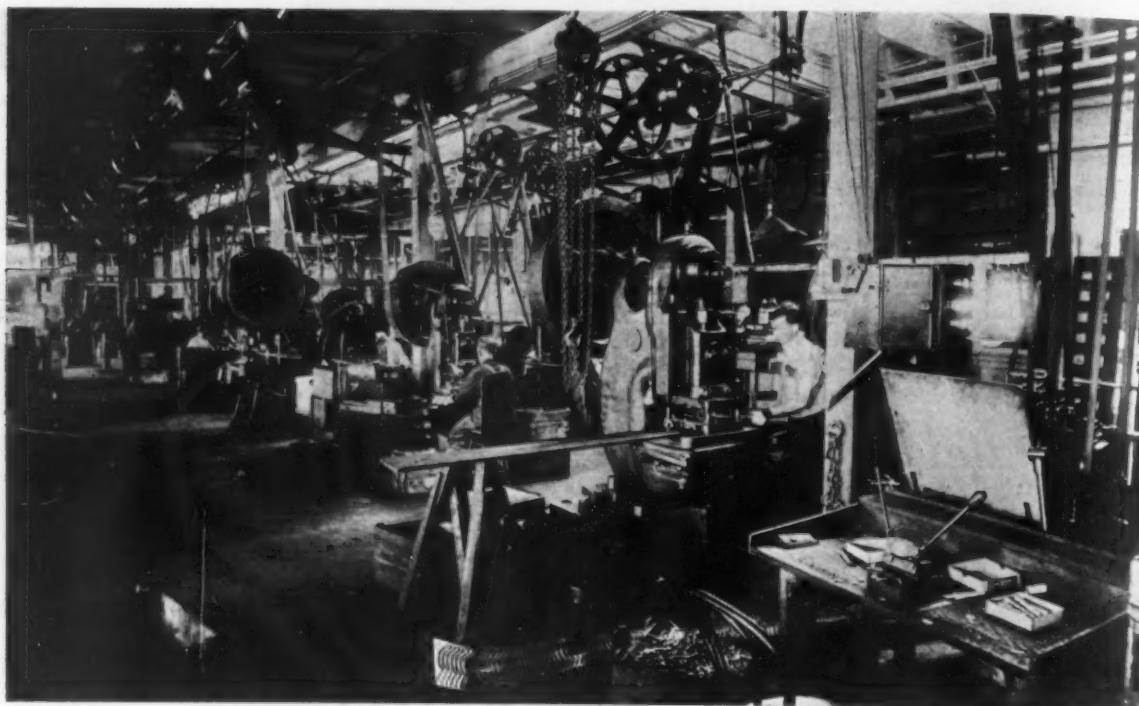
Seven Forms or Cards Used in Controlling Raw and Finished Materials and Their Movement Through the Processes of Manufacture

counting. If a wide discrepancy develops, however, a second check is made of the parts in store.

Ordering of parts from the factory is handled by means of production orders, given to the manufacturing department whenever it appears from the finished stock card that a new supply of parts is needed. All orders must be placed far enough in advance to permit plenty of time for their execution. The proper time allowance is not a matter of guess, but has been worked out carefully from a study of individual operations.

For each typewriter part, in fact, an operations card has been prepared. The card shown in Fig. 2 is for part No. C-88, a carriage shift link collar, of which there are two for each machine.

This part is made from 3/8-in. cold drawn round steel, of which 1000 typewriters require 11.2 lb., as indicated on the card. The figures at the extreme left of the card indicate the number of each operation in order, there being five operations in this instance. Next to the right are the numbers of the respective



Punch Press Department: This and the Screw Machine Section of the Plant Are the Two Primary Departments for the Production of Small Parts

departments in which these operations are to be performed. In the middle of the card a brief description of each step in the manufacture is indicated. Thus "automatic" means that the part is to be formed in the automatic screw machines. "Inspect," when used, indicates that an inspection must be made after the parts leave the screw machines. "Burr" means that any burrs remaining on the parts are to be removed in a drilling machine. "Mill flat" calls for the milling of the surface of the part, and "case harden in salt peter" and "burnish on lathe" require no explanation. The figure 12 at the top of the column on the right of the card signifies that an allowance of 12 days is permitted before the starting of the operations. This tolerance is to allow each foreman to arrange all the work within his department. Perhaps some of the cams required on a job just received may be in use on another job then running, or for other reasons the work can not be started immediately.

Under the figure 12 are indicated the number of working days set aside for each operation. Thus, 7 days are allowed for screw machine operations. The total number of days permitted for the completion of the parts, including the 12 days initial allowance, is 30. To this total is always added an additional flat allowance of 10 days, the theory being that new stock should arrive in the store room 10 days before the bins are empty. The significance of the figure 40 is appreciated by computing the number of parts required in 100 typewriters per day—assuming that this be the production of the plant. As two parts go into each machine, 200 parts are required daily, or 8000 in 40 days. This means that when only 8000 pieces are in stock, a new production order should be issued to insure replenishment of the supply by the time the existing stock is used up, i.e., in 40 days.

Checking Progress of Work

Of course, the mere placing of production orders does not insure their execution on time. It is evident that the management cannot sit back supinely and let matters take their course. Delays may result from numerous causes, such as the breakdown of a machine, the illness of an operator, etc. A means of checking the progress of the work is essential, and such a means has been supplied.

To obtain his pay each workman must fill out a schedule card, Fig. 4, showing his name, the number of the part he has worked on, of the production order, of the department, of the department section, the name of the operation, the number of hours worked and of pieces produced, the number rejected, returned and accepted, the rate of pay and the total day's wages. From these cards the cost department keeps a record of the progress of the work, on a cost-and-schedule sheet, Fig. 5. By comparing the time of completion of a given operation with the scheduled completion (as given on the operations card) which is indicated at the top of the sheet, it can be ascertained whether the work is falling behind.

Frequently a delay in one department is so slight that it suffices to speed up the work in a subsequent department. Sometimes, however, it is necessary to rush through an emergency order, known as a "sub order," calling for the completion of only a portion of the original order. At other times it may prove desirable to start an entirely new production order, as the delays to the first order might result in the requisition of all of the parts as soon as they reached the stock room, thereby again putting the factory behind the assembly department.

A cost-and-schedule sheet is made out for each production order. On both are indicated the number of the production order and of the part, the date of issuing the order, the number of pieces ordered and of operations in order, the department numbers, the name of each operation and the scheduled time for its completion. In addition, the production order shows the kind and amount of material required. Thus, in Fig. 6 it is indicated that 112 lb. of $\frac{3}{4}$ -in. round screw rod is required to make 10,000 pieces of part No. C-88. The production order also provides columns for the insertion of the number of the machine on which the work is done, the time taken for each operation, the number of the time clock, the date when each operation is actually finished, the O.K. of the inspector, the gross number of pieces produced, the rejections and the number accepted. Columns have also been provided to keep a record of sub-orders.

With each production order is issued a material

(Continued on page 761)

Scarcity of Common Labor in Industry

Immigration Law Operates to Hamper Manufacturing and Skilled Workmen May Yet Suffer from Present Policy

BY ACHESON SMITH*

IN view of the intimation that employers will seek the repeal of the present immigration law in order that they may procure low priced labor, it will be of interest to outline the situation as it confronts manufacturers and other employers in the United States. Those who have discussed immigration usually have done so with the necessity for severe restrictions in mind, either as to numbers or quality or both. The matter will be considered, therefore, from the standpoint of our actual need of men to do our laboring work, for such is obviously the case.

While it is, of course, true that every employer finds it necessary to procure his labor as cheaply as possible, it is not true that employers are anxious for more alien labor simply because it is cheap. The cost of labor is dependent both upon the wage paid and upon the amount of work done, and it has been our experience in this country that labor working for low rates is not always the cheapest. At present the output of many manufacturers is limited by the shortage of men, and employers are therefore desirous of having the number of immigrants increased because they need help, and they are perfectly willing to pay the prevailing wage rates.

The use of the word labor is likely to be rather ambiguous, as it is frequently used to cover the skilled trades and sometimes used to include all wage earners. In what follows the term labor is meant to include what is ordinarily known as common labor and does not include skilled workers.

Actual Loss in Day Laborers

There is at present a very definite scarcity of labor and there is evidence that many localities are seriously affected. Undoubtedly one of the principal contributing causes to the present shortage is our immigration law. In the eleven months of the Government year, ending with May 31, 1922, we gained by immigration 98,605 persons. In other words, about 98,000 more people came into the country than left it during that period. An analysis of the figures by races, however, shows that we actually lost in the nationalities that do our labor calling for muscular strength, while we gained largely in those people who come in to trade and follow other employment than labor. The adjoining tabulation, issued by the Bureau of Immigration, shows the immigrants and emigrants during eleven months of the Government year.

An inspection of the above figures indicates that we actually lost over 33,000 who labor and gained very largely in those who will probably not do the work of common labor. Too much cannot be said about the desirability of English, French and Scotch immigrants, for they certainly raise the standard of our foreign born population and are highly desirable. Looked at from the standpoint of the need for laboring men, they do not, however, help our present situation. We could get along without the 48,000 Hebrews whom we gained during the eleven months; but we are absolutely dependent upon alien labor to use the shovel and other simple implements of industry.

Dependence Upon Alien Labor

In the highly developed industrial sections of the United States practically no native born American will do laboring work, and the children of our foreign born, if they go to our public schools, will not do the work

of a common laborer. The tendency to rise socially and the natural tendency to avoid laborious tasks both make men shun such work. The result is that within our country we are not producing laboring men, and we are actually by our social and educational systems drawing men rapidly away from work of that class. Our experience for a great many years has shown that we are entirely dependent upon alien labor to do most of the manual laboring work, and unless an adequate

Race or People	July 1, 1921, to May 31, 1922	
	Immigrants	Emigrants
African (black)	4,631	1,905
Armenian	2,238	231
Bohemian and Moravian (Czech)....	3,049	4,128
Bulgarian, Serbian and Montenegrin..	1,358	5,559
Chinese	3,866	5,855
Croatian and Slovenian.....	3,755	3,914
Cuban	640	792
Dalmatian, Bosnian and Herzegovinian	284	510
Dutch and Flemish.....	3,503	1,981
East Indian	214	216
English	27,195	8,407
Finnish	2,301	1,117
French	12,467	3,099
German	28,462	5,311
Greek	3,794	7,117
Hebrew	48,388	763
Irish	17,127	2,104
Italian (North)	6,033	6,849
Italian (South)	34,843	43,475
Japanese	5,264	4,005
Korean	62	43
Lithuanian	1,425	4,395
Magyar	5,993	4,579
Mexican	14,223	5,541
Pacific Islander	7	3
Polish	6,209	29,986
Portuguese	1,775	5,830
Rumanian	1,501	4,094
Russian	2,237	2,667
Ruthenian (Russniak)	673	436
Scandinavian (Norwegians, Danes and Swedes)	15,570	3,868
Scotch	13,973	1,519
Slovak	5,947	3,203
Spanish	1,701	7,456
Spanish-American	1,257	1,603
Syrian	1,308	1,344
Turkish	38	250
Welsh	872	136
West Indian (other than Cuban).....	885	769
Other peoples	712	1,115
	284,780	186,175

supply is admitted the development of the country inevitably will be retarded.

It has been said that organized labor is largely responsible for the present immigration law—at least the unions strongly favored the passage of the act. They, of course, thought by curtailing the supply of labor to strengthen the union cause and help to keep up wages, and while the temporary effect will be in that direction they are bound to suffer in the long run. The work done by common laborers is fundamental and absolutely necessary. We have no means at present of avoiding the pick and shovel work which laborers are required to do.

Many labor saving devices have been brought out, and undoubtedly much more will be done in that direc-

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tion, but they can go only so far toward relieving the situation. It is safe to assume that there will always be a large amount of work that will have to be performed by men willing to exercise their muscles and in a very literal sense earn their bread by the sweat of their brows. Houses cannot be built if there are no men to make the excavations for the foundations. Bricklayers cannot work if there are no laborers to carry up the bricks. In fact, skilled labor of all kinds will soon find its employment restricted if there is a serious lack of laborers to do their part of the work. It is, therefore, to the interest of skilled labor, to the interest of the manufacturer and to the best interests of the country to admit more laboring men.

Organized Labor May Be a Loser

If it is true that organized labor wishes to restrict immigration in order to help the union cause, it is laboring under a great delusion, for the very success of the unions in increasing their wages has been due to the fact that they can benefit themselves at the expense of the rest of the people in the country. If by limiting immigration the wages of common laborers are forced to a high level, organized labor will inevitably have to accept lower wages—at least their wages will be lower comparatively. In other words, as it is impossible to increase the income of every one in the country except by greater production, it is obvious that if common laborers are largely increased in their wage others will have to take somewhat less. This is simply an economic truth that neither labor unions nor legislation can change.

It might interest some people to remember that immigrants become consumers as well as producers, and are therefore of distinct value to the country from both standpoints. When an immigrant is domiciled in his native land he is not a potential customer of the United States; that is, he probably will not buy anything from us. On the other hand, when he comes into our country he not only becomes a worker and a very important aid to the wealth producing agencies of the nation, but he also at once becomes a consumer to practically the extent of his income. Everything that he buys he purchases in this country, and our foreign born residents provide one of the largest single markets we have for our cotton, wool and foodstuffs.

There are important social reasons for limiting immigration and we should enforce strict regulations regarding physical health and mental capacity. It is well to insist upon a blood test and an intelligence test, such as has been proposed, for the purpose of raising the mental standard of those coming into the country. It is desirable to have such selection made in the country of origin and not permit the immigrant to start for the United States until he has received a certification regarding the necessary qualifications. We must insist upon freedom from disease and on mental capacity sufficient for intelligent citizenship. This is particularly true when we contemplate the second generation, for the descendants of foreign born parents have become a large percentage of our population and are wielding a very large influence in our social and political affairs.

The Question of Citizenship

It has been suggested that we admit only those who declare their intention of becoming citizens; but this would seem to be a very unimportant and perhaps useless provision. In the first place, the immigrant probably will not know what he intends to do when he leaves his native land, but will declare his intention to become a citizen solely for the purpose of being admitted to the United States. In the second place, if he finds congenial work here and becomes anchored in some locality he will very probably desire to become a citizen, anyway, and take the necessary steps. In the third place, the heavy flow of alien labor out of the United States and to the various European countries in times of business depression in the United States is a feature that has distinct advantages to our country, and as the alien has probably rendered full value for the wages received we should not object to his return to his native land.

If, as has been said, the children of foreign born tend away from common labor, we have a system of evolution which would seem to be very desirable, both from the standpoint of the immigrant and from the standpoint of the country. The class of immigrants who come here to labor have little or no education but they are capable of doing very useful work. After they have been in the United States for some years they begin to get into the semi-skilled jobs, and their children, after passing through our public schools, find themselves fitted by education and by inclination for work that is somewhat higher in the social scale than common labor. As the first generation passes away we are dependent upon new arrivals for the distinctly laboring work, and such new arrivals will in a generation become Americanized both politically and socially. We thus have an upward movement which, as has been said, seems to be very desirable both from the standpoint of the immigrant and a healthy trend among that class of our population.

Defects in Present Law

Our immigration law at present has three serious defects:

1. By the quota system it cuts down the number of entries into the United States to 3 per cent of the number of foreign born persons of such nationalities resident in the United States, as shown by the Census of 1910.
2. Apparently no allowance is made for those who go out of the country. For example, there might be an emigration of 5 per cent, whereas we restrict the immigration to 3 per cent, which would of course mean a net loss instead of the gain for which the law apparently provides.
3. A literacy test is required which, from the standpoint of the good of the country, is a farce. The immigrant is required to be able to read and understand at least one language, which means that many able-bodied men who wish to do some honest work are excluded, while every educated radical who does not wish to work may enter the country.

It would seem possible to work out a figure indicating the number of additional laborers annually needed to take care of the increasing demand; that is, the growth of the country plus the laborers who forsake laboring work. Immigration to at least that extent should be provided for and it should be a net figure. In other words, the number that is admitted should take into account those leaving the country so as to be sure that we have a certain net gain in men each year. The literacy test should be abolished, as it is of no value whatever and prevents many an industrious peasant from entering our country at a time when he is badly needed. Authority should be placed in the hands of the President, or power given a commission, to increase or decrease immigration in accordance with the needs of the country.

Due to the increased industrial activity we now have a shortage of laboring men, and if we are actually losing that grade of labor by emigration we are going to be in a serious situation. Steps should be taken to correct this condition as far as this can be done by legislation. Not only is the country working back to a normal state of activity, but we must remember that the country is growing steadily from year to year, which of course means that more and more common laborers will be needed, and if they are not admitted as immigrants it is not apparent at present whence they will come.

[By continents, the figures in the table on the preceding page show the following:

	Immigrants	Emigrants
Africa	4,631	1,905
Asia	12,990	11,844
Southern Europe	70,033	96,714
Northern Europe	130,014	65,026
Latin America	17,005	8,705
Miscellaneous	50,107	1,881

EDITOR.]

DROP FORGING INSTITUTE

Scheme of Operations of American Association Which Is to Meet in Detroit

In writing about the annual convention of the American Drop Forging Institute, to be held in Detroit on Oct. 3 to 6, concurrently with the convention of the American Society for Steel Treating, Scovell, Wellington & Co., commissioners of the association, have supplied some information of the objects and workings of the organization.

The institute was formed in 1920. The executive membership from the beginning has concerned itself with problems affecting the production of drop forgings for sale, including a study of raw material and supply markets, industrial relations, production and accounting methods, supply and demand for drop forgings, and the extension of the market therefor. Information, collected and distributed at regular intervals, covers: The total volume of purchases of the important classes of material, with current market prices. The rates of wages and earnings, hours of labor, and number of men employed, by classes. The total hammer-hours operated, as compared with the capacity of the membership, in each of several classes of equipment. The total tonnage of steel consumed, and the total volume of shipments made. The total volume of new business booked and of unfilled business on the books of the membership. As the product of the institute is almost exclusively contract forgings (the institute does not concern itself with finished product such as tools, wrenches, etc.) there are no average prices available, and the institute does not deal in any manner with the question of market prices of its product.

It was soon apparent that, in the consideration of many of these problems, the experience and knowledge of drop forgers whose product does not reach the market, but is absorbed either by themselves or by closely affiliated interests, would be valuable. In order to enlist their support, a manufacturing committee was appointed, with a director of the institute as general chairman, the members of which are chairmen of various regional groups. At present there are four such groups, as follows:

Atlantic, including New England, eastern New York and Pennsylvania, and the Atlantic Coast States. Chairman, J. B. Sehl, second vice-president Billings & Spencer Co., Hartford.

Central, including western New York and Pennsylvania, and Ohio. Chairman, E. E. Adams, general superintendent Cleveland Hardware Co., Cleveland.

Indiana-Michigan, including also Ontario. Chairman, R. T. Herdegen, vice-president and general manager Dominion Forge & Stamping Co., Ltd., Walkerville, Ont.

Western, including all territory west of the Indiana-Michigan boundaries. Chairman, F. A. Ingalls, vice-president Ingalls-Shepard Division, Wyman-Gordon Co., Harvey, Ill.

Ferdinand Barnickol, president Indianapolis Drop Forging Co., Indianapolis, is general chairman of the manufacturing committee, and A. D. Armitage, vice-president and general manager J. H. Williams & Co., Buffalo, is member-at-large.

These groups hold quarterly meetings, primarily to consider problems of production, engineering, shop accounting, and industrial relations, which are available to any drop forger interested in such problems, either through executive membership in the institute, if eligible, or as an associate member, if the character of his business is such as to make him ineligible for executive membership. The manufacturing committee is also in charge of the annual convention of the institute.

As the activities of the manufacturing committee would duplicate in large measure the work of the American Drop Forge Association, overtures were made to that organization looking toward amalgamation of the two bodies, and this was finally accomplished on Jan. 1, 1922, all members of the association being carried as associate members of the Institute until July 1, at which time they were given opportunity for continuing either as executive or associate members, depending upon their eligibility.

Among the first actions of the institute was the appointment of a cost committee to study cost accounting methods. A report on a survey of the industry, with recommendations for uniform methods, previously prepared for some of the larger members by Scovell, Wellington & Co., was made available to all members. Data on the present methods of cost accounting and estimating employed by the members have been collected periodically; and the committee, composed of J. B. Sehl, chairman; C. C. Winn, assistant treasurer; Wyman-Gordon Co., Worcester, Mass., and F. S. Hatch, assistant treasurer Moore Drop Forging Co., Springfield, Mass., is now issuing a series of articles to all members, both executive and associate, comprising a treatise on the "Essential of Drop Forging Accounting."

Besides the manufacturing division, in charge of the group meetings and of the annual convention, a purchasing agents' division was established early in the institute's history; and the organization of an accounting division, to further the work of the cost committee, is now contemplated. Other standing and special committees look after specific items in the institute's program.

The direction of the institute's policies is in the hands of a board of directors of nine members, three of whom are chosen each year for a three-year term. From among their number a president and two vice-presidents are chosen annually. Neither directors nor officers can serve for more than one term consecutively, except that ex-presidents are ex-officio advisory members of the board of directors. The present officers of the institute are:

President, J. H. Williams, president J. H. Williams & Co., Brooklyn, N. Y.

Vice-presidents, H. G. Stoddard, vice-president and treasurer Wyman-Gordon Co., Worcester, O. F. Transue, president and general manager Transue & Williams Steel Forging Corporation, Alliance, Ohio.

Directors, C. E. Adams, president Cleveland Hardware Co., Cleveland; F. C. Billings, president Billings & Spencer Co., Hartford; C. A. Brauchler, president and general manager Canton Drop Forging & Mfg. Co., Canton, Ohio; Ferdinand Barnickol, president, Indianapolis Drop Forging Co., Indianapolis; A. H. Chapin, president Moore Drop Forging Co., Springfield, Mass.; J. F. Connelly, vice-president Champion Machine & Forging Co., Cleveland.

Ex-president, F. A. Ingalls, vice-president Ingalls-Shepard Division, Wyman-Gordon Co., Harvey, Ill.

The affairs of the institute are administered by its commissioners from their office at 1168 Hanna Building, Cleveland.

Nagle Steel Plants to Resume Sept. 20

George H. Heck and associates, 518 Commercial Trust Building, Philadelphia, who, as announced in last week's issue, have purchased the Pottstown and Seyfert plants of the Nagle Steel Co., state that these plants will resume operations in the manufacture of sheets under the new management on Sept. 20. Details as to organization of the new company will be announced shortly. The Pottstown and Seyfert plants will be continued under the name of the Nagle Steel Co.

Minnesota Steel Company's First Steel

The recently completed wire rod mill of the Minnesota Steel Co., Duluth, Minn., rolled its first steel on Sept. 11. The mill will furnish rods to the new wire plant of the same company which, up to the present time, has been receiving rods from the Joliet mill of the American Steel & Wire Co.

Bone coal, formerly considered a waste, is to be used as a boiler fuel by the United States Coal & Coke Co., Gary, W. Va. The fuel will be utilized in pulverized form, and a pulverizing, distributing and burning system is being installed by the Fuller-Lehigh Co. Each 800-hp. boiler is to be equipped with five vertical burners, taking the fuel from five 3-in. screw feeders.

Laying Out and Drilling Machine

A new tool room machine, which in conjunction with the Johansson compound slide and blocks is calculated to make a complete, independent laying out and drilling machine for the spacing of holes in dies, jigs, templates, master-plates, etc., and to do it with Johansson accuracy in less time than it takes to do the work in any other way—in one-tenth of the time it



takes using buttons, it is stated, is being manufactured by Franz K. Krag, Chicago.

The head of the K-N machine swings a full 360 deg., allowing drilling to be done at any point in the circle. It has an interchangeable bushing supported in a rigid arm, integral with the machine, immediately above the work, to prevent any spring of the drill. The machine has six changes of speed, from 400 r.p.m. to 4300 r.p.m., furnishing the proper speeds for drills up to 1/4 in. in diameter.

Without the use of the Johansson compound slide

and blocks, the K-N machine is a precision, high-speed drilling machine with swinging head and drill guided immediately above the work, to insure speed and accuracy. The head is constructed so that it may be removed from the column and mounted on the milling machine screw, or for greater accuracy, in connection with the Johansson compound slide and blocks.

As a routing and milling machine, it works with a single lip cutter, which can be made up quickly for any shape desired. A locking screw is provided for locking the spindle in a fixed position. The spring idler keeps the belt at the proper tension, allowing the belt to slip, if too great pressure is exerted on the cutter, and thereby saving the cutter from breaking. The speed, which is seven times the milling machine speed, makes it possible to use a very small cutter.

E. L. Krag & Co., 50 West Randolph Street, Chicago, Ill., are the distributors for the K-N machines and attachments.

Inventories of the estate of Ferdinand Schlesinger filed in the probate court at Milwaukee show a valuation of \$2,062,709.55, exclusive of gifts aggregating \$6,374,678.34 made to members of his family over a period of six years prior to his death. The bulk of stocks consists of 60,711 shares of common stock of the Steel & Tube Co. of America, appraised at \$667,821, and shares in the Newport Mining Co., Detroit Iron & Steel Co., and Harrow Spring Co., Kalamazoo, Mich.

Ball Bearing Notable for Its Size

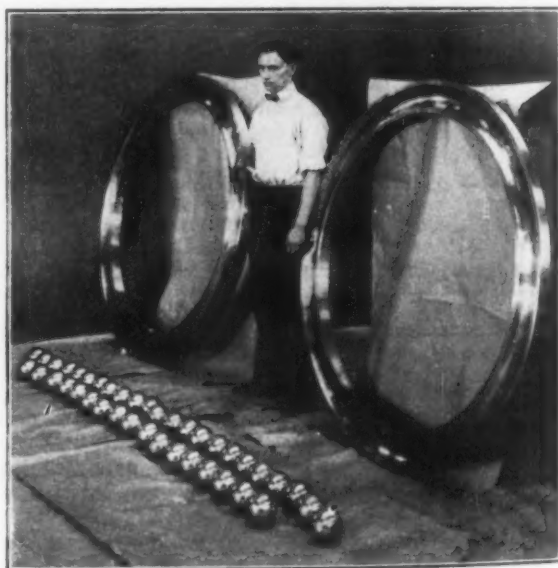
The Standard Machinery Co. Auburn, R. I., has completed a ball bearing which, it is believed, is the largest of its kind ever produced. It is worthy of note also because of the success attendant upon its manufacture and its recent duty in service as well.

The bearing is of the conventional design and consists of an upper raceway, a lower raceway, and 40 balls. The raceways are alike, being 56.25 in. plus 0.003 in. outside diameter, with inside diameter of 46 in. minus 0.003 in. and a thickness overall of 2.75 plus or minus 0.01 in. The balls are 4 in. in diameter and lapped to a tolerance of plus 0.003 in., minus zero. The raceways and balls are of chrome bearing steel hardened and ground, both showing a scleroscope hardness reading of 92 to 96.

The races are capable of carrying a sustained load of 100,000 lb. on one ball applied at any point in the circumference of the groove and each ball will stand a load of 100,000 lb. when placed between the finished races without showing any permanent deformation or surface cracks.

The balls were tested by the manufacturer under a Riehle testing machine using the three-ball method, wherein three balls are superimposed, the center ball being the one actually under test. The three-ball method has proved itself to be the most reliable for testing, and is replacing the old way of testing one ball between two hardened steel plates, this three-ball method being regarded as more severe, due to the fact that the ball under test is only supported by an actual point of contact, with the results likely to be accurate, consistent and reliable.

The formula used by the Standard Machinery Co. for crushing strength of steel balls under the three-ball method is $100 \times D^3$ where D represents the diameter of the ball in one-eighth inches. This would mean that the 4-in. balls would crush at a load of about



1,024,000 lb., while the design requires only a strength of 100,000 lb., so that an ample factor of safety was thus obtained. From the above analysis of this ball thrust bearing, it would thus be possible to subject it to a perfectly safe load of 4,000,000 lb., providing the stresses were equally divided on all the balls, and it would collapse under a load of 40,960,000 lb. under a uniformly distributed stress. The static load on this thrust bearing in service is about 550,000 lb.

At the top of page 589, in our issue of Sept. 7, it is stated that the new pig casting machine of the Emporium Iron Co., Emporium, Pa., was furnished by the Pittsburgh Coal Washer Co. We are now informed that this is an error; the machine was furnished by Heyl & Patterson, Inc., Pittsburgh.

Iron and Steel Electrical Engineers Meet

Cleveland Convention Was Notably Successful—Power Problems, Combustion and Electrification Discussed—Efficiency of Electric Power Supply

BOTH from the standpoint of attendance and interest taken in the technical sessions, and in the size and attractiveness of the exhibits, the sixteenth annual convention of the Association of Iron and Steel Electrical Engineers, held in the Public Hall, Cleveland, Sept. 11 to 14, was declared the most successful ever conducted by the association. Registration amounted to about 2300, including both members and visitors. The meeting place proved particularly well suited for the convention as the large exhibit room of the hall provided ample space for display and permitted the 85 exhibitors to make a more complete showing of their products than they could have done with a more limited space. The exhibits included electrical apparatus, handling equipment and other appliances used in steel plant operations.

Technical sessions, held in adjoining rooms on the same floor, were scheduled to continue until Friday noon, but a change was made in the program and the last session took place Thursday afternoon. These technical sections proved of much interest and several of the papers brought out considerable discussion. One entire day was devoted to the subject of fuel economies.

At the annual banquet, held at the Statler Hotel Thursday evening, several interesting speakers were on the program. These included Charles P. Steinmetz, chief consulting engineer General Electric Co.; the retiring president, W. S. Hill, electrical engineer Illinois Steel Co., South Chicago; J. S. Unger, manager of the research department Carnegie Steel Co., and C. L. Colens, president Reliance Mfg. Co., Cleveland. H. P. Bope, formerly general sales manager of the Carnegie Steel Co., was toastmaster. The Cleveland section entertained the visitors Tuesday evening with a dance and organ recital at the Public Hall. An interesting lecture on the science of numbers was given by E. Kieft, engineer of tests at the Gary plant of the Illinois Steel Co.

At the business meeting Monday forenoon R. B. Gerhardt, electrical engineer Bethlehem Steel Co., Sparrows Point, Md., was elected president for the ensuing year. Other officers elected were as follows: First vice-president, L. F. Galbraith, electrical engineer West Penn Steel Co., Brackenridge, Pa.; second vice-president, R. L. Shoemaker, superintendent of maintenance American Rolling Mill Co., Middletown, Ohio; directors, A. C. Cummins, electrical superintendent Carnegie Steel Co., Duquesne, Pa.; E. H. Wentz, electrical superintendent National Tube Co., Lorain, Ohio; B. G. Beek, electrical engineer American Sheet & Tin Plate Co., Gary, Ind.; George Schaeffer, electrical superintendent Carpenter Steel Co., Reading, Pa., and A. L. Freret, assistant chief electrical engineer Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.; treasurer, John Farrington, electrical superintendent LaBelle Iron Works, Steubenville, Ohio; secretary, John F. Kelly, Pittsburgh.

Papers and Discussions

L. W. Heller, general superintendent power stations, Duquesne Light Co., Pittsburgh, in a paper on "Steam Turbine Operation," said that the trend of steam turbine manufacture at present seems to be toward increasing the reliability of the equipment and refinement in design, and manufacture and operation are receiving more attention than ever before. His paper was devoted largely to a discussion of the methods used by the Duquesne Light Co. in the operation of its steam generating equipment. Tables were presented showing increasing size of the units installed, and their thermal efficiency and average performance. The author held

that the larger capacity power stations now required make the installation of turbine driven units desirable, and pointed out that the concentration of power allowed by these insulations means the saving of building space and the operation of greater power with a smaller number of attendants.

"Internal Combustion Engines for Power Generation in Steel Mills" was the subject of a paper by D. M. Petty, electrical engineer Bethlehem Steel Co., South Bethlehem, Pa., a gas engine rated at 4000 kw. being taken as the basis. A table was given showing that the average installed cost of a gas engine power plant, made up of three or more 4000-kw. units, is \$132 per kw. Operating costs were also tabulated. A 2700-kw. Diesel oil engine was also discussed. The speaker called attention to one point for future improvement in net operating efficiency, in the utilization of the heat contained in the exhaust gases. He said that reclaiming this energy is somewhat similar to the application of condensers to the steam turbine and that this field is merely scratched to-day in a few plants where boiler feed water is heated in a small way.

He pointed out that one of the principal items in operating costs in the past, the renewal of worn steel parts such as cylinders, piston rods, etc., has been materially reduced by the use of electric welding. Formerly, when the grooves of the piston became worn sufficiently to cause excessive leakage, it was necessary to remachine them and put in oversize piston rings. Now the worn pieces are filled by electric welding and machined out so that the life of the steel piston is almost indefinite. Formerly cylinders had to be scrapped because of cracks, but these are now welded. Cast steel was favored for gas engine parts because it can be welded, as well as for other reasons. Comparing internal combustion engines with steam engines for power station work the speaker pointed out that one great weakness of the steam power station is its standby losses or the coal that must be burned under the boilers to keep up steam pressure when all the power generating apparatus is shut down.

There was an interesting combined discussion on the two papers of steam turbine operation and internal combustion engines for steel plants, which brought out varying views on reliability, fuel costs, cost of repairs, etc., and some conflicting opinions as to the comparative merits of gas engines and steam engines in steel plants. W. M. Hampton, superintendent gas engine department of the Gary works of the Illinois Steel Co., discussed the operation of gas engines at that plant, where electricity is largely generated by the use of 56 gas engines. These engines at Gary are loaded up to their maximum power and steam turbines take the fluctuation in the load. Gas engines have proved their efficiency and reliability after nearly fifteen years of service and the United States Steel Corporation, particularly the Illinois Steel Co., is still buying gas engines. He declared that repair costs compare favorably with those for steam units of the same sizes. While some cylinders have cracked, others have been used fourteen years.

This discussion brought out remarks regarding more extensive uses of gas in steel plants. J. R. McDermott, chief engineer South works of the Illinois Steel Co., Chicago, favored developing the use of blast furnace gas for heating and melting in steel plants. He said that the South works has a gas surplus for reheating and contemplates its use for the open-hearth furnaces. R. B. Gerhardt stated that the Bethlehem Steel Co. proposes to use a mixture of blast furnace and coke oven

gas for heating furnaces, soaking pits, annealing furnaces and eventually for its open-hearth furnaces.

Combustion and Boiler Practice

W. W. Witting, assistant chief engineer Illinois Steel Co., Gary, Ind., presented a comprehensive paper on "Judging the Combustion of Gaseous Fuel from Gas Analysis" which indicated a large amount of research work on his part. He stated that fuel losses in a large steel plant are great, in spite of efforts to minimize them. Efforts are made to cut down fuel consumption and to obtain perfect combustion with a minimum surplus of air. In pursuit of this goal efforts are directed toward finding improved methods of producing such combustion, and the author stated that there is large room for improvement in design of burners, furnaces, etc., but that even of greater importance is the most efficient handling of equipment. He advocated the better utilization of the waste gas analysis and warned against the indiscriminate use of gas analyses. Various formulas were embodied in the paper. The writer stated that his purpose was to call attention to the fact that guesswork can be eliminated from the solution of combustion problems by means of waste gas analysis and to present a method that will extend the possibilities of their application. Another purpose was to point out the error that he declared is commonly committed in judging the quality and heating value of producer gas entirely from an analysis of the fixed gases it contained and neglecting the tarry vapors.

A topical discussion was held on "Boiler Practices of 1922." J. B. Crane, Geo. T. Ladd Co., Pittsburgh, Pa., discussed the present tendency in boiler design and said that with increasing cost of coal, higher boiler pressure and greater average loads economizers are justified on an investment basis in more cases than heretofore. R. E. Butler, Babcock & Wilcox Co., said that the average size boiler for large industrial plants is now probably around 1000 hp. as compared with 500 hp. ten years ago. To attain higher efficiency from boiler units more heating surface is being installed per foot of furnace width. The advantages of mechanical operation recently have led to experiments in the use of coal on forced blast chain grates and in a powdered form, blown into the furnace. In his opinion the blast chain grate seems particularly adapted to the lower grades of coal and coke braize. Theoretically the burning of powdered coal in suspension is an ideal way, but he declared a number of difficulties must be overcome before this method will to any great extent supersede the under feed stoker or blast chain grate stoker. R. M. Rush, Springfield Boiler Co., Pittsburgh, Pa., discussed the modern sectional head boiler and E. R. Fish and Alfred Cotton, Heine Power Co., St. Louis, discussed the Heine boiler practice.

Electrification

"A Review of Steel Mill Electrification," prepared by B. G. Lamme, chief engineer Westinghouse Electric & Mfg. Co., and W. Sykes, vice-president Canadian American Alloy Corporation, was read by G. E. Stoltz of the Westinghouse company. The writers held that one of the great defects of individual power plants of large industries is that the plant has not been laid out for future needs. Extensions are made as required but without looking ahead. With practice crystallizing in certain directions there is no longer much excuse for haphazard power developments. Mixed systems and mixed operations almost always represent a handicap in some form.

The authors held that from an efficiency standpoint the electric system as a whole is far ahead of anything else in power generation, transmission and utilization; from the flexibility standpoint it possesses great advantages and from the durability and maintenance standpoints electrical machinery ranks high. It was declared that the general trend in all industries is toward electrification and that there is a tendency toward securing power from central plants. The development of adequate and reliable gearing was credited with being a great impetus to the advance of electric drive.

One objection found to the use of steam for a prime

mover was that a power house is usually located close to the blast furnace to use the blast furnace gas and as the plant expands either long steam lines are required to supply distant power units or a multiplicity of power plants is required, both of which were declared uneconomical. In case of steam-driven units the power unit under the best conditions of load is less economical than a turbo generator unit.

Operating figures were checked up for two plants producing largely the same class of products and having approximately the same tonnages, one being electrically and the other steam driven. After making due allowances in every case for the value of blast furnace gas used and making adjustments for slight variations in the output, the figures showed that the electrically driven plant produced steel at between \$3 and \$4 per ton less than the steam-driven plant. Another investigation gave the electrically driven plant an advantage of \$2.50 per ton. The only comments on the paper were made by Dr. Unger, research department Carnegie Steel Co., who expressed the view that electricity will replace mechanical movers in steel plants.

"Generating Station Development" was discussed by David R. Rushmore and E. Pragst, General Electric Co., Schenectady, N. Y. Their paper called attention to the increase in capacity and efficiency of hydro-electric units, to marked advancement in turbine design, to rapid boiler development and to the increase in boiler size. The paper stated that it has been considered impractical in most cases to burn coal on stokers and gas in the same furnace. However, the Ford installation at River Rouge has proved that it is practical to burn both fuels in the same furnace, thus materially reducing the boiler capacity and resulting in various other economies.

It was declared that the developments in turbines during the past two or three years have been more pronounced than during any similar period. Attention was called to a recent development in air-cooling systems for use in connection with generators which should be of particular interest to the iron and steel industry. This includes a closed air circulating system and water sprays for cooling the air before it again re-enters the generator. The system is expected to find its principal application where impure air only is available for cooling. Looking into the future, the writers predicted the use of new fuels and among them probably the use of the energy of the sun as stored in plant life and utilized in some such form as alcohol.

F. C. Watson, electrical superintendent International Nickel Co., described in detail that company's works for the manufacture of monel metal at Huntington, W. Va.

Separation of Power Production from Manufacturing

A paper by Charles P. Steinmetz, chief consulting engineer General Electric Co., on "Improvement in Efficiency of Electric Power Supply" attracted an unusual amount of interest because of the author's prominence. He declared that power production has become a separate industry and that the best economy requires the separation of power production from the industries it serves. Economy also requires that by-product power of an industry be not wasted, even partly, but that it be used to its fullest extent for raw material for power. Power production is cheaper in large central stations than in small isolated stations. However, it would be uneconomical for an industry like the steel industry, producing blast furnace gas, to pay for power and waste the gas. Where considerable energy is available as a by-product of an industry this may be converted into power at a lower cost than power bought from a central station. Theoretically the most economical arrangement between a local station using the by-product energy of an industrial plant and a central power station would be an interchanging of power, power deficiencies being supplied by a central station, which would take any surplus power that might be produced by the isolated station.

Dr. Steinmetz held that the difficult problem in the relation between the electric power company and the individual corporations that use electric power and produce by-product energy is the financial one of the rate for power and energy. These rates should be based on

cost plus a fair profit. However, this is often difficult to work out, owing to the uncertainty as to the cost, this applying to the electric power and to the by-product energy such as blast furnace gas. He said that the best way to solve the problem would be to work out the engineering economy of the relation without regard to the rate question, and have a committee of both corporations make a continued study of the cost relations with a view to arriving at a fair agreement. He believed that a great step in the industrial development of the country would be taken were these economy relations worked out between a power company and a company producing by-product energy.

"The Electrification of Steel Plant Railroad Yards" was discussed by R. B. Gerhardt, electrical superintendent Bethlehem Steel Co., who dwelt on the power supply, conductor rail location and the locomotive design. He expressed the opinion that the day is almost here when the steam locomotive will take a back seat in some of the steel plants. In the discussion, Chairman W. S. Hall stated he was inclined to think that the electrification of steel plant yards depends almost wholly on the individual plants but he believed the tendency in the direction of electrification. E. Friedlander, Carnegie Steel Co., Braddock, Pa., said he did not think there is a steel plant in the country that could not electrify its yard. At his plant a third rail system has been operated for three years without an accident and the replacing of 25 steam locomotives with electric locomotives is being considered. He thought storage battery locomotives, where 12 or more are used, would be unsatisfactory, and held that a third rail track could be put anywhere in the mill yard, even in front of a blast furnace. Dr. Steinmetz discussed some of the electric problems involved and Dr. Unger predicted that in time all mill yards will be electrified.

Reports of Technical Committees

A comprehensive report of the Electrical Development Committee was submitted by its chairman, R. B. Gerhardt. A list was given of the main roll drives installed or placed on order during the year. Named as of foremost importance was the main roll drive ordered by the Youngstown Sheet & Tube Co. for a 30-in. reversing universal skelp mill. The list showed several mills of the continuous type using individual motor drives for separate stands. It was pointed out that, by the introduction of individual motors, particularly on the finishing stands, the speed relations between these stands can be adjusted and, due to the very flat relations, this speed is maintained regardless of the load. With this advantage the delivery speed of the mill can be increased and larger tonnages rolled at higher temperatures, so that more accurate gages are obtained. The list also showed a tendency to use direct current motors supplied by power from a motor generator set or a rotary converter, in preference to obtaining adjustable speed by means of auxiliary equipment used in connection with a wound rotor motor. The use of d.c. motors, particularly where several are desired, simplifies the equipment considerably, which reduces the amount of attention and inspection required.

Attention was called to a new type of variable speed alternating current motor drive known as the frequency converter set, the first installation of this kind having been made at the plant of the Scullin Steel Co., St. Louis. Another development was a new type of speed control for rod steel drives. This will keep the speed of the reels in synchronism with the delivery speed of the mill at all times. The a.c. adjustable speed brush shifting motor, although applied several years ago, has recently begun to receive the prominence to which it is entitled. Its particular field of application is in driving variable speed loads of high load factor, where the efficiency of operation is of importance, as in the case of draft fans, pumps, etc. The report stated that there has been a continuous effort on the part of power house designers and manufacturers of apparatus to improve the methods and means of electric energy production. Other means of increasing station economies were probably overshadowed by two more fundamental ones, namely, an increase in prime mover thermal economy

and an increase in the range of the heat cycle. Steam turbines have been greatly improved in detail during the past year and substantial advancement has been made in generator design. The steel industry requirements for oil breakers during the past year have shown a tendency toward the isolated cell type, with increased rupturing capacity and voltage rating.

Satisfactory advance during the year in the use of industrial heating in the iron and steel industry was reported. Consideration has been given in one or two cases to the possibilities of electrically heated soaking pits. Several steel plants have considered the metallic resistor type of furnace for low temperature heat treatment. In general, however, the possibilities of this type of furnace for working up to a temperature of 2000 deg. Fahr. have not been followed by steel manufacturers to the same extent as in industries using steel in making their products. In arc welding the principal developments during the year were in the modification and adaptation of the automatic arc welder.

On the subject of yard electrification, the committee stated that several large steel plants have this under consideration. The merits of each type of electric locomotive depends to some extent on the particular plant but, from a purely economical standpoint, the committee stated that the straight locomotive has considerable advantages over the storage battery or combination locomotive. The storage battery type has reached a high state of development in the mining industry and the committee saw no reason why the mining type cannot be enlarged to fill the needs of the steel plant. On the subject of lighting, reference was made to a new form of filament lamp with a tipless bulb which is regarded as exceptionally serviceable for portable cords and drop lights.

F. W. Cramer, engineer of tests Cambria Steel Co., chairman of the control committee, reported that for ten years the committee had devoted its time to the problems of control standardization but, other than submitting reports making recommendations, the work has produced no tangible results. Consequently, this year it was desired to have a subcommittee on control located in each of its section districts to obtain a general opinion of steel producers on what is desired in the way of standardization. The committee believed that the association should suggest to electrical manufacturers that all new designs contemplated should be submitted to a committee for approval or criticism. By following this plan, standardization could be gradually brought about.

Reports submitted by the Pittsburgh, Chicago, Philadelphia, Cleveland and Youngstown sections indicated that, while there is a difference of opinion as to the way standardization should be carried out and what part should be given first consideration, there is a great demand for standard parts. Following the recommendation of the committee, the association passed a resolution requesting the Cutler-Hammer Co., Electric Controller & Mfg. Co., General Electric Co. and Westinghouse Co. to delegate two men each to meet with the committee of the association to devise ways and means of standardizing contractor ratings, grid resistance and other parts of control apparatus, with a view to reducing the number of spare parts that a user must carry in stock.

In its report, submitted by R. G. Bauer, electrical engineer Clairton works of the Carnegie Steel Co., Clairton, Pa., the sub-committee on illumination stated that the incandescent lamp is now almost universally used, R. L. M. standard reflectors are used extensively throughout steel plants and safety requirements are given first consideration, resulting in lamps being placed in accessible places and provided with hangers for lowering. The committee adopted a plan of compiling solutions of different lighting problems. In one case marine fittings replace wire guards to shield lamp globes that were a target for boys. In one plant breakage of yard lamps and shades was cut down by using stationary instead of swinging fixtures.

Through D. M. Petty, Bethlehem Steel Co., the standardization sub-committee on motors recommended the appointment of a committee to confer with a committee of the Boiler Club to devise ways and means of standardizing ratings and dimensions for mill type motors.

A questionnaire on the use of anti-friction bearings was sent to 25 of the largest steel plants and the tabulation showed that the highest percentage of motor failures was due to oil. Some of the replies indicated that most of the failures could be eliminated by roller bearings. The committee recommended that bearing and motor manufacturers adopt standard anti-friction bearings.

In the report submitted by F. A. Wiley, electrical superintendent Wisconsin Steel Works, South Chicago, the safety committee declared that the accident problems involve two essential elements, safeguarding and education. An organization plan for safeguarding and a list of general safety rules were submitted.

Exhibits

The exhibitors included the following:

Cleveland Crane & Engineering Co., Wickliffe, Ohio, tramrail system equipped with a hook for handling wire coils; VanDorn Electric Tool Co., Cleveland, drill, reaming and grinding machines; American Blower Co., Detroit, fans; Johns-Manville, Inc., New York, insulating material; Baker R & L Co., Cleveland, trucks and tractors; Chicago Pneumatic Tool Co., New York, drilling machines; Taylor Instrument Companies, pyrometers; Allen Bradley Co., Milwaukee, electric controlling devices; Atlas Car & Mfg. Co., Cleveland, low lift storage battery trucks; Reliance Electric & Engineering Co., Cleveland, motors; Wilson Welder Metals Co., New York, welding outfits; Cutler-Hammer Mfg. Co., Milwaukee, 60-in. magnetic clutch; Leeds & Northrup, Philadelphia, electric furnace; American Steel & Wire Co., Cleveland, cable and other wire products; Hayward Co., New York, buckets; Alliance Machine Co. Alliance, Ohio, models of ladle, crane and other trolleys; R. H. Beaumont Co., Philadelphia, miniature skip hoisting system, steel bunker and coal weighing larry; Electric Controller & Mfg. Co., Cleveland, control equipment and lifting magnets; Westinghouse Electric & Mfg. Co., control panels, automatic pressure regulators, safety switches, arc welding outfits, electric furnace and lighting equipment; National Lamp Works, and Ivanhoe Regent Works of General Electric Co., Cleveland, lamps and reflectors; General Electric Co., Schenectady, N. Y., 40-ton storage battery locomotive, arc welding machine, control panels; Crocker-Wheeler Co., Ampere, N. J., motors; Cutler Electric & Mfg. Co., Philadelphia, circuit breakers; Mercury Mfg. Co., Chicago, tractors; R. D. Nuttall Co., Pittsburgh, helical gears; Mutual Electric & Machine Co., Atlanta, Ga., safety switches; Tool Steel Gear & Pinion Co., gears and pinions; Thompson Electric Co., Cleveland, lighting fixtures; Aldrich Pump Co., Allentown, Pa., hydraulic pumps; Lakewood Engineering Co., Cleveland, clam shell bucket, tractors and lifting trucks; Louis Allis Co., Milwaukee, motors; Shepard Electric Crane & Hoist Co., Montour Falls, N. Y., electric hoists; Euclid Crane Hoist Co., Euclid, Ohio, hoists and switches; Ohio Electric & Controller Co., Cleveland, controllers; Pittsburgh Transformer Co., Pittsburgh, transformers; S. K. F. Industries, Inc., New York, ball bearings.

Welding Meeting in Chicago

The fall meeting of the American Welding Society will be held in Chicago, Oct. 2, 3, 4 and 5, in the rooms of the Western Society of Engineers, 1735 Monadnock Block. Among the committee reports to receive consideration are the following: Specifications for steel to be welded, W. J. Beck, chairman; electric arc welding, H. M. Hobart, chairman; gas welding, S. W. Miller, Union Carbide and Carbon Research Laboratories, chairman; welded rail joints, Dr. G. K. Burgess, Bureau of Standards, chairman.

Among the papers scheduled are the following: Gas Welding of Cast Iron, by S. W. Miller; Thermo Welding and Cast Iron, by J. H. Deppeler, chief engineer Metal & Thermo Corporation; Electric-Arc Welding of Cast Iron, by William Namack, Davison-Namack Foundry Co.

Co-operation Between Engineering School and Foundries

LAFAYETTE, IND., Sept. 14.—During July and August E. E. Wendt, of the engineering staff of Purdue University, visited 57 foundries in Indiana and interviewed 100 foundrymen in an effort to help them solve their problems. Mr. Wendt teaches foundry work. Many of the foundrymen were in favor of holding a conference or meeting at Purdue University next spring and a number expressed a willingness to take Purdue students into their plants during the summer vacations.

Machine Tool Exhibition at New Haven

The machine tool exhibition to be held at the Mason Laboratory of mechanical engineering of Yale University, New Haven, under the auspices of the New Haven branch of the American Society of Mechanical Engineers, Yale University, and the New Haven Chamber of Commerce, is taking on large proportions. It will be opened at 7 p.m., daylight saving time, Thursday, Sept. 21, and will be open in the daytime on both Friday and Saturday. The list of exhibitors numbers 109 and comprises mostly New England manufacturers of machine tools and machine shop accessories with a number of scattering exhibits from other parts of the country. It is planned to have motion pictures on all three evenings and speakers of authority on a number of subjects. There is no admission charge for spectators. The exhibition is a co-operative undertaking intended to serve manufacturers, buyers and users of machine tools with the idea of helping to improve business conditions, particularly in New England.

The tentative program of speakers includes the following: Dean Charles H. Warren, Sheffield Scientific School, on Co-operation between the Colleges and the Machine-Tool Industry; Henry B. Sargent, Sargent & Co., New Haven; Melville D. Liming, of the Boston Chamber of Commerce, on outlook for industry in New England; Earle Buckingham on machine tools, standardization and interchangeable manufacture; Oscar R. Wikander on standardization activity in Germany; William Calkins on design, manufacture and performance of twist drills; Gardner T. Swarts, Jr., on application of graphic control to machine-tool manufacture; and Oswald W. Knauth, secretary National Bureau of Economic Research, on analysis of income in the United States.

The National Association of Farm Equipment Manufacturers will hold its twenty-ninth annual convention at the Congress Hotel, Chicago, Oct. 18 to 20, inclusive. The program has not yet been announced.

COMING MEETINGS

September

Machine Tool Exhibition. Sept. 21, 22 and 23. Mason Laboratory, Yale University, New Haven, Conn. Connecticut section American Society of Mechanical Engineers. Harry R. Westcott, 207 Orange Street, New Haven, Chairman Exhibition Committee.

Amerienn Electrochemical Society. Sept. 21, 22 and 23. Fall meeting, Windsor Hotel, Montreal, Canada. Secretary, Dr. Collin G. Fink, Columbia University, New York.

American Institute of Mining and Metallurgical Engineers. Sept. 25 to 29. Pacific Coast meeting, Engineers' Club, San Francisco. Secretary, F. F. Sharpless, 29 West Thirty-ninth Street, New York.

October

American Society for Steel Treating. Oct. 2 to 7. Convention and exposition, General Motors Co. Building, Detroit. Secretary, W. H. Eisenman, 4600 Prospect Avenue, Cleveland.

American Drop Forging Institute. Oct. 3 to 6. Annual convention, General Motors Building, Detroit. Commissioners, Scovell, Wellington & Co., 1168 Hanna Building, Cleveland.

Society of Industrial Engineers. Oct. 18 to 20. McAlpin Hotel, New York. Business manager, George C. Dent, 327 South LaSalle Street, Chicago.

American Gear Manufacturers' Association. Oct. 9, 10 and 11. Semi-annual meeting, Chicago. Secretary, T. W. Owen, 2443 Prospect Avenue, S. E. Cleveland.

Labor Problems in Electric Melting*

Best Melter One with No Previous Furnace Training— Bonus for Charging—Metallurgist in Charge of Laboratory and Furnaces

BY CHARLES WELLMAN FRANCIS

THERE is a great tendency to use foreign labor in present-day electric furnace practice. This fact may be partly explained by the inability to get American-born laborers to stick to furnace work. While the alien often makes a good, steady workman on the furnaces, his inability to cope with emergencies, due largely to the fact that he does not readily comprehend the orders given him, is a great handicap to him on a job where quick action is often necessary. The foreigner trains himself to go about his duties in sequence and, by observing what other workmen on similar jobs at his side are doing, he thus becomes methodical in various tasks. This attribute is a valuable one provided his fellow workmen are of the proper caliber; otherwise he often becomes a detriment to the department.

Training a Melter

In training a man for the position of melter it is essential to secure one of at least the average intelligence who is English-speaking, active and energetic. It is my experience that the man who has had no previous furnace training often makes the most receptive pupil and finally develops into the best melter. Many electric steel foundry executives have tried at short notice to break in converter blowers as melters, or have taken an open-hearth helper for a melter rather than pay the higher salary for a man who thoroughly understands the electric furnace, only to change their policy after they have paid dearly for the experiment. It is not intended to detract from the ability of the converter or open-hearth men in this respect, for they were placed in a position which they could not learn in a week, the entire situation tending in many instances to give the electric furnace the discredit which it in no way deserved.

One side of the labor question vital to the highest efficiency in electric furnace operation is the attitude of the melter toward his furnace helpers. I regret to say that there are certain types of experienced workmen, especially among steel melters, who hide the scrap of paper on which they figure a furnace charge or work out an alloy addition as though it were the only thing that kept them from being discharged. Fortunately this narrow-mindedness is gradually being eliminated, especially so in the last few years when more young college and university men are getting into electric furnace departments.

Metallurgist in Charge of Furnaces

There are very few furnace departments in which we do not find the melter and the chemist at times working at odds. These differences, perhaps petty, often lead to more serious troubles, which in turn are sometimes more noticeable than the results both men should desire to obtain. A good arrangement is to have a metallurgist who is both a steel melter and a chemist in charge of both laboratory and furnaces.

The chemist will report to the metallurgist on the analysis of preliminary heat tests, together with the time required to make the determinations, while the melter will make a report to the metallurgist on the alloy additions he makes as a result of the chemist's analysis. Thus the majority of the friction can be eliminated.

Probably the greatest labor problem encountered is that of the furnace charging. It is difficult to get men to stick to the work, especially in hot weather. The best plan is to place this work on a bonus basis, allowing a certain length of time for charging a given amount of scrap. If the men better this time, pay them extra money at a given rate per minute for each minute less than the allotted time. This will give an incentive for fast work and at the same time the melter must see that the furnace is not charged carelessly.

Friction Between Electricians and Furnacemen

There is often considerable friction between the electricians and the furnace helpers which is absolutely unnecessary. This often comes when the electric furnace helpers begin to feel that they know the electrical side of the installation as well as the electricians themselves. Consequently when electrical troubles arise, instead of calling immediately for the electricians, they try to remedy the difficulty themselves and often make matters worse. I have seen this occur time after time, especially concerning the automatic electrode regulators. These electro-mechanical devices for manipulating the electrodes are extremely sensitive equipment, and no one should be permitted to tamper with them who does not thoroughly understand their workings.

The heats come so fast and frequently from an electric furnace, especially the acid furnace, that unless the proper supervision and co-operation of the helpers is given, the entire equipment will soon become extremely dirty; this in many instances has been the cause of long delays and even accidents and injuries.

There are a number of tasks about the furnace which must be performed after each heat if the equipment is to be kept in the best working condition; namely, cleaning out the furnace pit and placing clean dry sand on the bottom; blowing off the furnace roof with an air hose; repairing the sill of the charging door and the runway of the pouring spout, also a thorough cleaning of the switchboard and panels by means of an air hose. The use of an air hose on the electrode arms is advisable about once a day, because the dust which settles in the foundry is very high in iron and consequently may readily cause the breaking down of the insulation, which might result in the short-circuiting of the equipment and burning out of some very valuable parts, hard to replace at short notice. It is for this same reason that the furnace sub-station should be sealed as tightly as possible to prevent this iron-impregnated dust from settling.

Familiarity with the workings of an electric furnace frequently makes furnace helpers exceedingly careless around the electrical equipment. One habit which they often acquire first is to push or pull the

*In the issue of July 27, p. 201, the author discussed the choice of an electric furnace; in the issue of Aug. 3, p. 277, the economy features of electric foundry design and equipment; in the issue of Aug. 10, p. 345, acid electric furnace practice; in the issue of Aug. 17, p. 421, basic electric furnace operation, and in the issue of Aug. 31, p. 525, costs of electric melting. This is the concluding article.

Metal Duties in Fordney-McCumber Tariff

A Return to Protection, with High Rates on Ferroalloys and Raw Materials—President May Be Called on to Change These—Foreign Valuation the Basis

BY L. W. MOFFETT

WASHINGTON, Sept. 19.—With the passage of the new Fordney-McCumber bill, the country returns to a protective tariff, and on the whole the measure is quite similar to the Payne-Aldrich act so far as rates are concerned. This is reflected in the metal and other schedules, though in some respects the metal schedule carries high rates not even approached previously. This is particularly true of the ferroalloy and cutlery sections. The rates on rolled steel products, however, do not vary much from, and in some cases are identical with, the Payne-Aldrich rates. All duties when on an ad valorem basis are fixed on foreign valuation.

The chief factors in making the rates, perhaps, were the so-called agricultural bloc and the Western mining interests, as shown by the protection given on their products and the reduction in rates on some of the products they consume. The metal schedule has been left in the form in which it was reported out by the conference.

The most significant portions of the new measure, however, are its administrative features. Outstanding among these is a provision which establishes an altogether new method of handling the tariff. By some it is interpreted as to an extent taking the tariff out of politics, though obviously it is far from doing this completely. This provision relates to authority granted the President, at his request, to determine flexible rates under certain conditions, more fully described elsewhere in this issue. Directly related is another provision giving broader authority to the United States Tariff Commission and in a degree providing for reorganization of the commission.

Possible Changes in Iron and Steel Duties

It now becomes an interesting question as to the use that will be made of these provisions. For instance, it is quite conceivable that iron and steel interests, who are greatly dissatisfied with the duties levied on raw products they consume, will appeal under these provisions to have an investigation made by the commission and to have the President reduce the duties through proclamation. At the same time the right is given to interests supplying these, as well as all other products, to ask for an investigation and request that the President through the same course increase the duties, which may be fixed on either foreign or American valuation. The iron and steel trade, as is well known,

strongly opposed the duties fixed on manganese ore, ferromanganese, ferrosilicon, magnesite and several other products. The new administrative features are held to be a substantial move toward a scientific tariff; and while opposition to them has been raised on the ground that they are unconstitutional, it was broken down and the features adopted. They yet may become the subject of tests in the courts. Under the new provisions the Tariff Commission is clothed with authority to study conditions under the existing tariff law and report upon the competitive conditions in American industry with respect to the relationship between the domestic and foreign branches of the industry and state what rates would be needed to equalize those conditions. Previously the commission had no authority to make recommendations as to rates.

The metal schedule itself was the object of prolonged hearings and considerable debate on the floors of Congress, especially in the Senate. Independent iron and steel interests made suggestions as to rates, and while some were adopted, many were disregarded, particularly as to the ferroalloy section. Most of the rates on the rolled products met with no strong opposition from the industry, though suggestions were made which would have balanced the schedule more satisfactorily. An example is the disposition made of barbed wire, in compliance with the supposed wishes of agricultural interests. This commodity is left on the free list. While it is just as costly to make because of labor and other costs as other forms of wire, it is left free of duty, while wire products in general are made dutiable.

The new tariff measure was before Congress for an unusually long period, even for legislation of this kind, traditionally a party issue. Hearings were started before the House Committee on Ways and Means on Jan. 6, 1921. The bill was passed in the House on July 21, 1921, and it was passed by the Senate on Aug. 19, 1922, after which it was reported to conference. The Underwood-Simmons bill was under consideration from April to October, 1913.

Below is given the metal schedule of the new act. Inserted in the schedule are the corresponding provisions of the Underwood-Simmons tariff and of the previous tariff, the Payne-Aldrich act. The Underwood-Simmons duties are given in parentheses (), while the Payne-Aldrich duties are given in brackets [].

New Duties Compared with Underwood Schedules

301. Iron in pigs, iron kentledge, spiegeleisen (all on free list) [all \$2.50 per ton] containing more than 1 per cent of carbon, 75c. per ton; wrought and cast scrap iron, and scrap steel, (all scrap on free list) [scrap \$1 per ton] valued at not more than 7c. per lb., 75c. per ton: Provided, That spiegeleisen for the purpose of this Act shall be an iron manganese alloy containing less than 30 per cent of man-

ganese: Provided further, That nothing shall be deemed scrap iron or scrap steel except secondhand or waste or refuse iron or steel fit only to be remanufactured.

302. Manganese ore or concentrates containing in excess of 20 per cent of metallic manganese, (free list) 1c. per lb. on the metallic manganese contained therein: molybdenum ore or concentrates, 35c. per lb. on the metallic

molybdenum contained therein; tungsten ore or concentrates, 45c. per lb. on the metallic tungsten contained therein; ferromanganese containing more than 1 per cent of carbon, (free list) [\$2.50 per pound] 1½c. per lb. on the metallic manganese contained therein: Provided, That ferromanganese for the purpose of this Act shall be such iron manganese alloys as contain 30 per cent or more of manganese; manganese metal, manganese silicon, manganese boron, and ferromanganese and spiegeleisen containing not more than 1 per cent of carbon, (free list) [\$2.50 per ton] 1½c. per lb. on the manganese contained therein and 15 per cent ad valorem; ferromolybdenum, metallic molybdenum, molybdenum powder, calcium molybdate, and all other compounds and alloys of molybdenum, 50c. per lb. on the molybdenum contained therein and 15 per cent ad valorem; ferrotungsten, metallic tungsten, tungsten powder, tungstic acid, and all other compounds of tungsten, 60c. per lb. on the tungsten contained therein and 25 per cent ad valorem; ferrochromium tungsten, chromium tungsten, chromium cobalt tungsten, tungsten nickel, and all other alloys of tungsten not specially provided for, 60c. per lb. on the tungsten contained therein and 25 per cent ad valorem; ferrosilicon, containing 8 per cent or more silicon and less than 60 per cent, 2c. per lb. on the silicon contained therein; containing 60 per cent or more of silicon and less than 80 per cent, 3c. per lb. on the silicon contained therein; containing 80 per cent or more of silicon and less than 90 per cent, 4c. per lb. on the silicon contained therein; containing 90 per cent or more silicon, and silicon metal, 8c. per lb. on the silicon contained therein; ferrochrome or ferrochromium containing 3 per cent or more of carbon, 3½c. per lb. on the chromium contained therein; ferrochrome or ferrochromium containing less than 3 per cent of carbon, and chrome or chromium metal, 30 per cent ad valorem; ferrophosphorus, ferrotitanium, ferrovanadium, ferroureanum, ferrozirconium, zirconiumferrosilicon, ferroboreon, titanium, zirconium, chromium nickel, vanadium nickel, zirconium nickel, chromium vanadium, chromium silicon, zirconium silicon, calcium silicide, and all alloys used in the manufacture of steel not specially provided for, 25 per cent ad valorem; cerium metal, \$2 per lb.; ferrocerium and all other cerium alloys, \$2 per lb. and 25 per cent ad valorem; ductile tantalum metal or ductile nonferrous alloys of tantalum metal, 40 per cent ad valorem. (ferroalloy paragraph carried 15 per cent) [ferroalloys 20 to 25 per cent]

303. Muck bars, bar iron, and round iron in coils or rods, iron in slabs, blooms, loops, or other forms less finished than iron in bars and more advanced than pig iron, except castings; all of the foregoing, valued at not over 1c. per lb., 2/10 of 1c. per lb.; valued above 1c. and not above 1½c. per lb., 3/10 of 1c. per lb.; valued above 1½c. and not above 2½c. per lb., 5/10 of 1c. per lb.; valued above 2½c. and not above 3½c. per lb., 8/10 of 1c. per lb.; valued above 3½c. and not above 5c. per lb., 1c. per lb.; valued above 5c. per lb., 1½c. per lb. (5 per cent) [6/10c., 4/10c. and 3/10c. per lb., according to size]

304. Steel ingots, cogged ingots, blooms and slabs, by whatever process made; die blocks or blanks; billets and bars, whether solid or hollow; shafting; pressed, sheared, or stamped shapes, not advanced in value or condition by any process or operation subsequent to the process of stamping; hammer molds or swaged steel; gun-barrel molds not in bars; alloys not specially provided for, used as substitutes for steel in the manufacture of tools; all descriptions and shapes of dry sand, loam, or iron molded steel castings; sheets and plates and steel not specially provided for; all of the foregoing valued at not over 1c. per lb., 2/10 of 1c. per lb. [7/40c. per lb. on value of ¾c. per lb. or less and ranging up to 4.6c. per lb. on value of 16c. to 24c.]; valued above 1c. and not above 1½c. per lb., 3/10 of 1c. per lb.; valued above 1½c. and not above 2½c. per lb., 5/10 of 1c. per lb.; valued above 2½c. and not above 3½c. per lb., 8/10 of 1c. per lb.; valued above 3½c. and not above 5c. per lb., 1c. per lb.; valued above 5c. and not above 8c. per lb., 1 7/10c. per lb.; valued above 8c. and not above 12c. per lb., 2½c. per lb.; valued above 12c. and not above 16c. per lb., 3½c. per lb.; valued above 16c. per lb., 20 per cent ad valorem: Provided, That on steel circular saw plates there shall be levied, collected and paid an additional duty of ¼ of 1c. per lb. (Ingots, billets, etc., by Bessemer, or open-hearth process, free list; electric, crucible and alloy ingots, etc., 15 per cent)

305. In addition to the rates of duty provided for in this schedule on steel in all forms and shapes, by whatever process made, and by whatever name designated, whether cast, hot or cold rolled, forged, stamped, or drawn, containing more than 6/10 of 1 per cent of nickel, cobalt, vanadium, chromium, tungsten, molybdenum, or any other metallic element used in alloying steel, there shall be levied, collected, and paid 8 per cent ad valorem: Provided, That manganese and silicon shall not be considered as alloying material unless present in the steel in excess of 1 per cent manganese or silicon: Provided further, That an additional

cumulative duty of 65c. per lb. on the molybdenum content in excess of 6/10 of 1 per cent, and 72c. per lb. on the tungsten content in excess of 6/10 of 1 per cent shall be levied, collected, and paid on any material provided for in paragraph 304 containing molybdenum and tungsten.

306. All metal produced from iron or its ores, which is cast and malleable, of whatever description or form, without regard to the percentage of carbon contained therein, whether produced by cementation, or converted, cast, or made from iron or its ores, by the crucible, electric, Bessemer, Clapp-Griffith, pneumatic, Thomas-Gilchrist, basic, Siemens-Martin, or open-hearth process, or by the equivalent of either, or by a combination of two or more of the processes, or their equivalents, or by any fusion or other process which produces from iron or its ores a metal either granular or fibrous in structure, which is cast and malleable, excepting what is known as malleable-iron castings, shall be classed and denominated as steel.

307. Boiler or other plate iron or steel, except crucible plate steel and saw plate steel, not thinner than 100 9/1000 in., cut or sheared to shape or otherwise, or unsheared, and skelp iron or steel sheared or rolled in grooves, valued at 1c. per lb. or less, 7/20 of 1c. per lb. [from 3/10c. on 8/10c. value to 6/10c. on 3c. value]; valued above 1c. per lb. and not above 3c. per lb., 5/10 of 1c. per lb.; valued at over 3c. per lb., 20 per cent ad valorem [20 per cent]: Provided, That all sheets or plates of iron or steel thinner than 100 9/1000 in. [No. 11 to No. 12 wire gage] shall pay duty as iron or steel sheets. (all plates 12 per cent)

308. Sheets of iron or steel, common or black, of whatever dimensions, and skelp iron or steel, valued at 3c. per lb. or less, thinner than 100 9/1000 and not thinner than 38/1000 in., 45/100 of 1c. per lb.; thinner than 38/1000 and not thinner than 22/1000 in., 55/100 of 1c. per lb.; thinner than 22/1000 and not thinner than 10/1000 in., 75/100 of 1c. per lb.; thinner than 10/1000 in., 85/100 of 1c. per lb.; corrugated or crimped, 75/100 of 1c. per lb.; all the foregoing when valued at more than 3c. per lb., 20 per cent ad valorem: Provided, That all sheets or plates of common or black iron or steel not thinner than 100 9/1000 in. shall pay duty as plate iron or plate steel. (All black sheets 12 per cent) [5/10c. on 3c. value and less and thinner than No. 10 wire gage ranging up to 9/10c. on thinner than No. 32 gage; over 3c. value, 20 per cent]

309. All iron or steel sheets, plates, bars, and rods, and all hoop, band, or scroll iron or steel, excepting what are known commercially as tin plates, terneplates, and taggers tin, when galvanized or coated with zinc, spelter, or other metals, or any alloy of those metals, shall pay 2/10 of 1c. per lb. more duty [same] than if the same was not so galvanized or coated; sheets or plates composed of iron, steel, copper, nickel, or other metal with layers of other metal or metals imposed thereon by forging, hammering, rolling, or welding, 30 per cent ad valorem [40 per cent]; thermostatic metal in sheets, plates, or other forms, 50 per cent ad valorem (new provision); sheets and plates of iron or steel, polished, planished, or glanced, by whatever name designated, 1½c. per lb. [1½c.]: Provided, That plates or sheets of iron or steel, by whatever name designated, other than polished, planished, or glanced, herein provided for, which have been pickled or cleaned by acid, or by any other material or process, or which are cold-rolled, smoothed only, not polished, shall pay 2/10 of 1c. per lb. [same] more duty than the rates provided on corresponding thicknesses of common or black sheet iron or steel. (For all above, except new provision 15 per cent ad valorem.)

310. Sheets or plates of iron or steel, or taggers iron or steel, coated with tin or lead, or with a mixture of which these metals, or either of them, is a component part, by the dipping or any other process, and commercially known as tin plates, terneplates, and taggers tin, 1c. per lb. [1.2c. per lb.]

311. No article not specially provided for which is wholly or partly manufactured from tin plate, terneplate, or sheet, plate, hoop, band, or scroll iron or steel, or of which such tin plate, terneplate, sheet, plate, hoop, band, or scroll iron or steel shall be the material of chief value, shall pay a lower rate of duty than that imposed on the tin plate, terneplate, or sheet, plate, hoop, band, or scroll iron or steel from which it is made, or of which it shall be the component thereof of chief value.

312. Beams, girders, joists, angles, channels, cartruck channels, tees, columns and posts, or parts or sections of columns and posts, deck and bulb beams, and building forms, together with all other structural shapes of iron or steel, not assembled, manufactured or advanced beyond hammering, rolling, or casting, 1/5 of 1c. per lb. (10 per cent) [3/10c. to 4/10c. per lb.]; any of the foregoing machined, drilled, punched, assembled, fitted, fabricated for use, or otherwise advanced beyond hammering, rolling, or casting, 20 per cent ad valorem (10 per cent) [45 per cent]; sashes, frames, and building forms, of iron or steel, 25 per cent ad valorem.

313. Hoop, band, and scroll iron or steel, not specially provided for, valued at 3c. per lb. or less, 8 in. or less in width, and thinner than 3/8 and not thinner than 100 9/1000 in., 25/100 of 1c. per lb. (10 per cent) [3/10c. per lb.]; thinner than 100 9/1000 and not thinner than 38/1000 in., 35/100 of 1c. per lb. (10 per cent) [4/10c. per lb.]; thinner than 38/1000 in., 55/100 of 1c. per lb. (10 per cent) [6/10c. per lb.]; Provided, That barrel hoops of iron or steel, and hoop or band iron, or hoop or band steel, flared, splayed, or punched, with or without buckles or fastenings, shall pay no more duty than that imposed on the hoop or band iron or steel from which they are made; bands and strips of iron or steel, whether in long or short lengths, not specially provided for, 25 per cent ad valorem. (10 per cent) [35 per cent]

314. Hoop or band iron, and hoop or band steel, cut to lengths, or wholly or partly manufactured into hoops or ties, coated or not coated with paint or any other preparation, with or without buckles or fastenings, for baling cotton or any other commodity, 1/4 of 1c. per lb. (free list) [3/10c. per lb.]

315. Wire rods: Rivet, screw, fence, and other iron or steel wire rods, whether round, oval, or square, or in any other shape, nail rods and flat rods up to 6 in. in width ready to be drawn or rolled into wire or strips, all the foregoing in coils or otherwise, valued at not over 4c. per lb., 3/10 of 1c. per lb. (10 per cent) [3/10c. per lb.]; valued at over 4c. per lb., 6/10 of 1c. per lb.; (10 per cent) [3/10c. per lb.] Provided, That all round iron or steel rods smaller than 20/100 in. in diameter shall be classified and dutiable as wire; Provided further, That all iron or steel wire rods which have been tempered or treated in any manner or partly manufactured shall pay an additional duty of 1/4 of 1c. per lb. (10 per cent) [1/2c. per lb.]; Provided further, That on all iron or steel bars and rods of whatever shape or section which are cold rolled, cold drawn, cold hammered, or polished in any way in addition to the ordinary process of hot rolling or hammering, there shall be paid 1/4 of 1c. per lb. [same] in addition to the rates provided on bars or rods of whatever section or shape which are hot rolled; and on all strips, plates, or sheets of iron or steel of whatever shape, other than polished, planished, or glanced sheet iron or sheet steel, which are cold hammered, blued, brightened, tempered, or polished by any process to such perfected surface finish or polish better than the grade of cold rolled, smoothed only, there shall be paid 2/10 of 1c. per lb. (10 per cent) [4/10c. per lb.] in addition to the rates provided on plates, strips, or sheets of iron or steel of common or black finish of corresponding thickness or value.

316. Round iron or steel wire, not smaller than 95/1000 in. in diameter, 3/4 of 1c. per lb.; smaller than 95/1000 and not smaller than 65/1000 in. in diameter, 1 1/4c. per lb. (15 per cent) [1 1/4c. per lb.]; smaller than 65/1000 in. in diameter, 1 1/2c. per lb. (15 per cent) [1 1/4c. per lb.]; Provided, That all of the foregoing valued above 6c. per lb. shall pay a duty of 25 per cent ad valorem; all wire composed of iron, steel, or other metal, not specially provided for (except gold, silver, or platinum); all flat wires and all steel in strips not thicker than 1/4 in. and not exceeding 16 in. in width, whether in long or short lengths, in coils or otherwise, and whether rolled or drawn through dies or rolls, or otherwise produced, 25 per cent ad valorem (15 per cent) [35 per cent]; Provided, That all wire of iron, steel, or other metal coated by dipping, galvanizing, sherardizing, electrolytic, or any other process with zinc, tin, or other metal, shall pay a duty of 2/10 of 1c. per lb. in addition to the rate imposed on the wire of which it is made; [same] telegraph, telephone, and other wires and cables composed of iron, steel, or other metal (except gold, silver, or platinum), covered with or composed in part of cotton, jute, silk, enamel, lacquer, rubber, paper, compound, or other material, with or without metal covering, 35 per cent ad valorem (15 per cent) [40 per cent]; wire rope and wire strand, 35 per cent ad valorem; spinning and twisting ring travelers, 35 per cent ad valorem (30 per cent) [maximum wire duty and 1c. per lb.]; wire heddles and healds, 25c. per 1000 and 30 per cent ad valorem. (30 per cent) [25c. and 40 per cent.]

317. All galvanized wire not specially provided for, not larger than 20/100 and not smaller than 8/1000 in. in diameter, of the kind commonly used for fencing purposes, (free) [wire duty plus 2/10c. per lb.] galvanized wire fencing composed of wires not larger than 20/100 and not smaller than 8/100 in. in diameter, and all wire commonly used for baling hay or other commodities, 1/2 of 1c. per lb. (free) [not less than 40 per cent]

318. Woven-wire cloth: Gauze, fabric, or screen, made of wire composed of steel, brass, copper, bronze, or any other metal or alloy, not specially provided for, with meshes not finer than thirty wires to the lineal inch in warp or filling, 25 per cent ad valorem; with meshes finer than 30 and not finer than 90 wires to the lineal inch in warp or filling, 35 per cent ad valorem; with meshes finer than 90

wires to the lineal inch in warp or filling, 45 per cent ad valorem. (15 per cent) [maximum wire duty plus 1c. per lb.]

319. Iron or steel anchors and parts thereof [1c. per lb.]; forgings of iron or steel, or of combined iron and steel, not machined, tooled, or otherwise advanced in condition by any process or operation subsequent to the forging process, not specially provided for, 25 per cent ad valorem. (12 per cent) [30 per cent]

320. Electric storage batteries and parts thereof, storage battery plates, and storage battery plate material, wholly or partly manufactured, all the foregoing not specially provided for, 40 per cent ad valorem. (20 per cent) [45 per cent]

321. Antifriction balls and rollers, metal balls and rollers commonly used in ball or roller bearings, metal ball or roller bearings, and parts thereof, whether finished or unfinished, for whatever use intended, 10c. per lb. and 45 per cent ad valorem. (35 per cent) [45 per cent]

322. Railway fishplates or splice bars, and tie plates, made of iron or steel, 1/4 of 1c. per lb. (10 per cent) [3/10c. per lb.]; rail braces, and all other railway bars made of iron or steel, and railway bars made in part of steel, T rails, and punched iron or steel flat rails, 1/10 of 1c. per lb. (free) [7/40c. per lb.]

323. Axles and parts thereof, axle bars, axle blanks, and forgings for axles, of iron or steel, without reference to the stage or state of manufacture, not specially provided for (10 per cent), valued at not more than 6c. per lb., 6/10 of 1c. per lb. [3/4c. per lb.]; Provided, That when iron or steel axles are imported fitted in wheels, or parts of wheels, of iron or steel, they shall be dutiable at the same rate as the wheels in which they are fitted, (same) [same]

324. Wheels for railway purposes, and parts thereof, of iron or steel, and steel-tired wheels for railway purposes, wholly or partly finished, and iron or steel locomotive, car, or other railway tires and parts thereof, wholly or partly manufactured, 1c. per lb. (20 per cent) [1 1/4c. per lb.]; Provided, That when wheels for railway purposes, or parts thereof, of iron or steel, are imported with iron or steel axles fitted in them, the wheels and axles together shall be dutiable at the same rate as is provided for the wheels when imported separately.

325. Jewelers' and other anvils weighing less than 5 lb. each, 45 per cent ad valorem; all other anvils of iron or steel, or of iron and steel combined, by whatever process made, or in whatever stage of manufacture, 1 1/2c. per lb. (15 per cent) [1 1/4c. per lb.]

326. Blacksmiths' hammers, tongs, and sledges, track tools, wedges, and crowbars, of iron or steel, 1 1/2c. per lb. (10 per cent) [1 1/4c. per lb.]

327. Cast-iron pipe of every description [1 1/4c. per lb.], cast-iron andirons, plates, stove plates, sadirons, tailors' irons, hatters' irons, but not including electric irons, and castings and vessels wholly of cast iron [8/10c. per lb.], including all castings of iron or cast-iron plates which have been chiseled, drilled, machined, or otherwise advanced in condition by processes or operations subsequent to the casting process but not made up into articles, or parts thereof, or finished machine parts [2/10c. per lb. extra]; castings of malleable iron not specially provided for [7/10c. per lb.]; cast hollow ware, coated, glazed, or tinned [1 1/4c. per lb.], but not including enameled ware and hollow ware containing electrical elements, 20 per cent ad valorem. (All the above 10 per cent)

328. Lap-welded, butt-welded, seamed, or jointed iron or steel tubes, pipes, flues, and stays, not thinner than 65/1000 in. if not less than 3/4 in. in diameter, 3/4 of 1c. per lb.; if less than 3/4 and not less than 1/4 in. in diameter, 1 1/4c. per lb.; if less than 1/4 in. in diameter, 1 1/2c. per lb. (All 20 per cent) [1c. to 2c.] Provided, That no tubes, pipes, flues, or stays made of charcoal iron shall pay a less rate of duty than 1 1/4c. per lb. [1 1/4c.]; cylindrical and tubular tanks or vessels, for holding gas, liquids, or other material, whether full or empty; welded cylindrical furnaces, tubes and flues made from plate metal, whether corrugated, ribbed, or otherwise reinforced against collapsing pressure, and all other finished or unfinished iron or steel tubes not specially provided for, 25 per cent ad valorem [30 per cent]; flexible metal tubing or hose, whether covered with wire or other materials, including any appliances or attachments affixed thereto, not specially provided for, and rigid iron or steel tubes or pipes prepared and lined or coated in any manner suitable for use as conduits for electrical conductors, 20 per cent ad valorem. (all 20 per cent)

329. Chain and chains of all kinds, made of iron or steel, not less than 1/4-in. in diameter, 3/4 of 1c. per lb.; less than 3/4 and not less than 3/8 in. in diameter, 1 1/4c. per lb.; less than 3/8 and not less than 5/16 in. in diameter, 2 1/4c. per lb.; less than 5/16 in. in diameter, 4c. per lb.; sprocket and machine chains, of iron or steel, and parts thereof, 35 per cent ad valorem (25 per cent); anchor or stud link chain, 2 in. or more in diameter, 1 1/4c. per lb.; less than

2 in. in diameter, 2c. per lb. (All except sprocket and machine, 20 per cent) [chains $\frac{3}{4}$ to 3c. per lb. but not less than 45 per cent]; Provided, That all articles manufactured wholly or in chief value of chain shall not pay a lower rate of duty than that imposed upon the chain of which it is made, or of which chain is the component material of chief value.

330. Nuts, nut blanks, and washers, of wrought iron or steel, $\frac{6}{10}$ of 1c. per lb. (5 per cent); bolts, with or without threads or nuts, and bolt blanks, of iron or steel, 1c. per lb. (10 per cent); spiral nut locks, and lock washers, of iron or steel, 35 per cent ad valorem. (30 per cent) [all $\frac{1}{4}$ c. per lb.]

331. Cut nails and cut spikes, of iron or steel [$\frac{4}{10}$ of 1c. per lb.], exceeding 2 in. in length, $\frac{4}{10}$ of 1c. per lb.; cut tacks and brads, hobnails and cut nails, of iron or steel, not exceeding 2 in. in length, 15 per cent ad valorem; horseshoe nails, and other iron or steel nails, not specially provided for, $\frac{1}{4}$ c. per lb. [$\frac{1}{4}$ c. per lb.]; nails, spikes, tacks, brads, and staples, made of iron or steel wire, not less than 1 in. in length nor smaller than $\frac{65}{1000}$ in. in diameter, $\frac{4}{10}$ of 1c. per lb.; less than 1 in. in length and smaller than $\frac{65}{1000}$ in. in diameter, $\frac{3}{4}$ of 1c. per lb. [$\frac{3}{4}$ c. per 1000 to $\frac{3}{4}$ c. per lb.]; spikes, tacks, brads, and staples, not specially provided for, $\frac{6}{10}$ of 1c. per lb. (all on free list)

332. Rivets, studs, and steel points, lathed, machined, or brightened, and rivets or studs for nonskidding automobile tires, 30 per cent ad valorem (20 per cent) [45 per cent]; rivets of iron or steel, not specially provided for, 1c. per lb. (20 per cent) [$\frac{1}{4}$ c. per lb.]

333. Common horse, mule, or ox shoes, of wrought iron or steel, $\frac{1}{5}$ of 1c. per lb. (free) [$\frac{3}{4}$ c. per lb.]; horse, mule, or ox shoes, punched, drilled or tapped, of wrought iron or steel, for use with adjustable wrought-iron or steel skid calks, and solid drop-forged calked shoes of wrought iron or steel, 1c. per lb.

334. Steel wool, 10c. per lb. (20 per cent) [40 per cent]; steel shavings, 5c. per lb. (20 per cent) [40 per cent]; and in addition thereto, on all of the foregoing, 30 per cent ad valorem.

335. Grit, shot, and sand of iron or steel, in any form, $\frac{3}{4}$ of 1c. per lb. (30 per cent) [1c. per lb.]

336. Corset clasps, corset steels, and dress steels, whether plain or covered with cotton, silk, or other material, 35 per cent ad valorem. (15 per cent) [35 per cent]

337. Card clothing not actually and permanently fitted to and attached to carding machines or to parts thereof at the time of importation, when manufactured with round iron or untempered round steel wire, 20 per cent ad valorem; when manufactured with tempered round steel wire, or with plated wire, or other than round iron or steel wire, or with felt face, wool face, or rubber-face cloth containing wool, 45 per cent ad valorem. (all 10 to 35 per cent) [all 20 to 55c. per sq. ft.]

338. Screws, commonly called wood screws, of iron or steel, 25 per cent ad valorem. (25 per cent) [3 to 10c. per lb.]

339. Table, household, kitchen, and hospital utensils, and hollow or flat ware, not specially provided for; composed of iron or steel and enameled or glazed with vitreous glasses, 5c. per lb. and 30 per cent ad valorem [40 per cent]; composed wholly or in chief value of aluminum, 11c. per lb. and 55 per cent ad valorem (all above, 25 per cent); composed wholly or in chief value of copper, brass, steel, or other base metal, not specially provided for, 40 per cent ad valorem; and in addition thereto, upon any of the foregoing articles containing electrical heating elements as constituent parts thereof, 10 per cent ad valorem.

340. Crosscut saws, mill saws, pit and drag saws, circular saws, steel band saws, finished or further advanced than tempered and polished, hand, back, and all other saws, not specially provided for, 20 per cent ad valorem (12 per cent) [5c. per ft. to 5c. per lb. and 20 per cent extra; Jewelers' or piercing saws, 40c. per gross. [25 per cent]]

341. Steel plates, stereotype plates, electrotype plates, halftone plates, photogravure plates, photo-engraved plates, and plates of other materials, engraved or otherwise prepared for printing, and plates of iron or steel engraved or fashioned for use in the production of designs, patterns, or impressions on glass in the process of manufacturing plate or other glass, 25 per cent ad valorem (15 per cent) [25 per cent]; lithographic plates of stone or other material engraved, drawn, or prepared, 25 per cent ad valorem. (25 per cent) [50 per cent]

342. Umbrella and parasol ribs and stretchers, composed wholly or in chief value of iron, steel, or other metal, in frames or otherwise, and tubes for umbrellas, wholly or partly finished, 50 per cent ad valorem. (35 per cent) [same]

343. Spring-beard needles, and other needles for knitting, sewing, shoe, or embroidery machines of every description, not specially provided for, and crochet needles, \$1.15 per 1000 and 40 per cent ad valorem; latch needles, \$2 per 1000

and 50 per cent ad valorem [above, \$1 to \$1.15 per 1000 and 25 to 35 per cent extra]; tape, knitting, and all other needles, not specially provided for, bodkins of metal, and needle cases or needle books furnished with assortments of needles or combinations of needles and other articles, [25 per cent] 45 per cent ad valorem. (all 20 per cent)

344. Fishhooks, fishing rods and reels, artificial flies, artificial baits, snelled hooks, leaders or casts, and all other fishing tackle and parts thereof, fly books, fly boxes, fishing baskets or creels, finished or unfinished, not specially provided for, except fishing lines, fishing nets, and seines, 45 per cent ad valorem (30 per cent); Provided, That any prohibition of the importation of feathers in this Act shall not be construed as applying to artificial flies used for fishing, or to feathers used for the manufacture of such flies.

345. Saddlery and harness hardware: Buckles, rings, snaps, bits, swivels, and all other articles of iron, steel, brass, composition, or other metal, not plated with gold or silver, commonly or commercially known as harness hardware, 35 per cent ad valorem (15 per cent); all articles of iron, steel, brass, composition, or other metal, not plated with gold or silver, commonly or commercially known as saddlery or riding bridle hardware, 50 per cent ad valorem; all the foregoing, if plated with gold or silver, 60 per cent ad valorem.

346. Belt buckles, trouser buckles, and waistcoat buckles, shoe or slipper buckles, and parts thereof, made wholly or partly of iron, steel, or other base metal, valued at not more than 20c. per 100, 5c. per 100; valued at more than 20 and not more than 50c. per 100, 10c. per 100; valued at more than 50c. per 100, 15c. per 100; and in addition thereto, on all of the foregoing, 20 per cent ad valorem. (15 per cent)

347. Hooks and eyes, wholly or in chief value of metal, whether loose, carded, or otherwise, including weight of cards, cartons, and immediate wrappings and labels, $\frac{4}{4}$ c. per lb. and 25 per cent ad valorem. (15 per cent)

348. Snap fasteners and clasps, and parts thereof, by whatever name known, or of whatever material composed, not plated with gold, silver, or platinum, and not mounted on tape, 55 per cent ad valorem; mounted on tape, including sew-on fasteners, 60 per cent ad valorem. (15 per cent)

349. Metal trouser buttons (except steel) and nickel bar buttons, $\frac{1}{12}$ of 1c. per line per gross; steel trouser buttons, $\frac{3}{4}$ of 1c. per line per gross; buttons of metal, not specially provided for, $\frac{3}{4}$ of 1c. per line per gross; and in addition thereto, on all of the foregoing, 15 per cent ad valorem; metal buttons embossed with a design, device, pattern, or lettering, 45 per cent ad valorem; Provided, That the term "line" as used in this paragraph shall mean the line button measure of $\frac{1}{40}$ in.

350. Pins with solid heads, without ornamentation, including hair, safety, hat, bonnet, and shawl pins; and brass, copper, iron, steel, or other base metal pins, with heads of glass, paste, or fusible enamel; all the foregoing not plated with gold or silver, and not commonly known as jewelry, 35 per cent ad valorem. (20 per cent) [35 per cent]

351. Pens, metallic, not specially provided for, 12c. per gross (8c.) [12c.]; with nib and barrel in one piece, 15c. per gross. (12c.) [15c.]

352. Penholder tips, penholders and parts thereof, [5c. per gross and 25 per cent] gold pens [25 per cent], combination penholders comprising penholders, pencil, rubber eraser, automatic stamp, or other attachments, 25c. per gross and 20 per cent ad valorem [45 per cent]; mechanical pencils made of base metal and not plated with gold, silver, or platinum, 45c. per gross and 20 per cent ad valorem (all 25 per cent); Provided, That pens and penholders shall be assessed for duty separately.

353. Fountain pens, fountain-pen holders, stylographic pens, and parts thereof, (25 per cent) [30 per cent] 72c. per doz. and 40 per cent ad valorem; Provided, That the value of cartons and fillers shall be included in the dutiable value.

354. Penknives, pocketknives, clasp knives, pruning knives, budding knives, erasers, manicure knives, and all knives by whatever name known, including such as are denominatively mentioned in this Act, which have folding or other than fixed blades or attachments, valued at not more than 40c. per doz., 1c. each and 50 per cent ad valorem; valued at more than 40 and not more than 50c. per doz., 5c. each and 50 per cent ad valorem; valued at more than 50c. and not more than \$1.25 per doz., 11c. each and 55 per cent ad valorem; valued at more than \$1.25 and not more than \$3 per doz., 18c. each and 55 per cent ad valorem; valued at more than \$3 and not more than \$6 per doz., 25c. each and 50 per cent ad valorem; valued at more than \$6 per doz., 35c. each and 55 per cent ad valorem; blades, handles, or other parts of any of the foregoing knives or erasers shall be dutiable at not less than the rate herein imposed upon knives and erasers valued at more than 50c. and not exceeding \$1.25 per doz.; cuticle knives, corn knives, nail files, tweezers, hand forceps, and parts thereof, finished or unfinished, by whatever name known, 60 per cent ad

valorem (35 to 55 per cent) [40 per cent and up to 20c. each with 40 per cent extra]: Provided, That any of the foregoing, if imported in the condition of assembled, but not fully finished, shall be dutiable at not less than the rate of duty herein imposed upon fully finished articles of the same material and quality, but not less in any case than 15c. each and 55 per cent ad valorem: Provided further, That all the articles specified in this paragraph, when imported, shall have the name of the maker or purchaser and beneath the same the name of the country of origin die sunk conspicuously and indelibly on the shank or tang of at least one or, if practicable, each and every blade thereof.

355. Table, butchers', carving, cooks', hunting, kitchen, bread, cake, pie, slicing, cigar, butter, vegetable, fruit, cheese, canning, fish, carpenters' bench, curriers', drawing, farriers', fleshing, hay, sugar-beet, beet-topping, tanners', plumbers', painters', palette, artists', shoe, and similar knives, forks, and steels, and cleavers, all the foregoing, finished or unfinished, not specially provided for, with handles of mother-of-pearl, shell, ivory, deer, or other animal horn, silver, or other metal than aluminum, nickel silver, iron or steel, 16c. each; with handles of hard rubber, solid bone, celluloid, or any pyroxylin, casein, or similar material, 8c. each; with handles of any other material, if less than 4 in. in length, exclusive of handle, 2c. each; if 4 in. in length or over, exclusive of handle, 8c. each; and in addition thereto, on all of the foregoing, 45 per cent ad valorem (25 to 30 per cent) [not under 40 per cent]; any of the foregoing without handles, with blades less than 6 in. in length, 2c. each and 45 per cent ad valorem; with blades 6 in. or more in length, 8c. each and 45 per cent ad valorem: Provided, That all articles specified in this paragraph, when imported, shall have the name of the maker or purchaser and beneath the same the name of the country of origin die sunk legibly and indelibly upon the blade in a place that shall not be covered.

356. Planing-machine knives, tannery and leather knives, tobacco knives, paper and pulp mill knives, roll bars, bed plates, and all other stock-treating parts for pulp and paper machinery, shear blades, circular cloth cutters, circular cork cutters, circular cigarette cutters, meat-slicing cutters, and all other cutting knives and blades used in power or hand machines, 20 per cent ad valorem.

357. Nail, barbers', and animal clippers, pruning and sheep shears, and all scissors and other shears, and blades for the same, finished or unfinished, valued at not more than 50c. per dozen, 3½c. each and 45 per cent ad valorem; valued at more than 50c. and not more than \$1.75 per doz., 15c. each and 45 per cent ad valorem; valued at more than \$1.75 per doz., 20c. each and 45 per cent ad valorem [15c. per doz. and 15 per cent to 75c. per doz. and 25 per cent] (all above, 30 per cent): Provided, That all articles specified in this paragraph, when imported, shall have die sunk conspicuously and indelibly, the name of the maker or purchaser and beneath the same the name of the country of origin, to be placed on the outside of the blade, between the screw or rivet and the handle of scissors and shears (except pruning and sheep shears), and on the blade or handle of pruning and sheep shears and clippers.

358. Safety razors, and safety razor handles and frames, 10c. each and 30 per cent ad valorem; razors and parts thereof, finished or unfinished, valued at less than 75c. per doz., 18c. each; valued at 75c. and less than \$1.50 per doz., 25c. each; valued at \$1.50 and less than \$3 per doz., 30c. each; valued at \$3 and less than \$4 per doz., (35 to 55 per cent) [35 per cent up to 15c. each and 35 per cent] 35c. each; valued at \$4 or more per doz., 45c. each; and in addition thereto, on all of the foregoing, 45 per cent ad valorem: Provided, That finished or unfinished blades for safety razors shall pay a duty of 1c. each and 30 per cent ad valorem: Provided further, That all articles specified in this paragraph, when imported, shall have the name of the maker or purchaser and beneath the same the name of the country of origin die sunk conspicuously and indelibly on the blade or shank or tang of each and every blade and on safety razors and parts thereof.

359. Surgical instruments, and parts thereof, composed wholly or in part of iron, steel, copper, brass, nickel, aluminum, or other metal, finished or unfinished, 45 per cent ad valorem; dental instruments, and parts thereof, composed wholly or in part of iron, steel, copper, brass, nickel, aluminum, or other metal, finished or unfinished, 35 per cent ad valorem (20 per cent) [45 per cent]: Provided, That all articles specified in this paragraph, when imported, shall have the name of the maker or purchaser and beneath the same the name of the country of origin die sunk conspicuously and indelibly on the outside, or if a jointed instrument on the outside when closed.

360. Philosophical, scientific, and laboratory instruments, apparatus, utensils, appliances (including drawing, surveying, and mathematical instruments), and parts thereof, composed wholly or in chief value of metal, and not plated with gold, silver, or platinum, finished or unfinished, not specially

provided for, 40 per cent ad valorem (20 per cent) [45 per cent]: Provided, That all articles specified in this paragraph, when imported, shall have the name of the maker or purchaser and beneath the same the name of the country of origin die sunk conspicuously and indelibly on the outside, or if a jointed instrument on the outside when closed.

361. Pliers, pincers, and nippers of all kinds, finished or unfinished, 60 per cent ad valorem (30 per cent) [8c. per lb. and 40 per cent]: Provided, That all articles specified in this paragraph, when imported, shall have the name of the maker or purchaser and beneath the same the name of the country of origin die sunk conspicuously and indelibly on the outside of the joint.

362. Files, file blanks, rasps, and floats, of whatever cut or kind, 2½ in. in length and under, 25c. per doz.; over 2½ and not over 4½ in. in length, 47½c. per doz.; over 4½ and under 7 in. in length, 62½c. per doz.; 7 in. in length and over, 77½c. per doz.

363. Sword blades, and swords and side arms, irrespective of quality or use, wholly or in part of metal, 50 per cent ad valorem. (30 per cent) [50 per cent]

364. Muzzle-loading muskets, shotguns, rifles, and parts thereof, 25 per cent ad valorem. (15 per cent) [25 per cent]

365. Double or single barreled breech-loading and repeating shotguns, rifles, and combination shotguns and rifles, valued at not more than \$5 each, \$1.50 each; valued at more than \$5 and not more than \$10 each, \$4 each; valued at more than \$10 and not more than \$25 each, \$6 each; valued at more than \$25 each, \$10 each; and in addition thereto, on all of the foregoing, 45 per cent ad valorem; barrels for breech-loading and repeating shotguns and rifles, further advanced in manufacture than rough bored only, \$4 each; stocks for breech-loading shotguns and rifles, wholly or partly manufactured, \$5 each; and in addition thereto, on all of the foregoing, 50 per cent ad valorem (35 per cent) [75c. each and 25 per cent extra to \$6 each and 35 per cent extra]; on all parts of such guns or rifles, and fittings for such stocks or barrels, finished or unfinished, 55 per cent ad valorem (35 per cent): Provided, That all breech-loading shotguns and rifles imported without a lock or locks or other fittings shall be subject to a duty of \$10 each and 55 per cent ad valorem.

366. Pistols: Automatic, magazine, or revolving, and parts thereof and fittings thereof, valued at not more than \$4 each, \$1.25 each; valued at more than \$4 and not more than \$8 each, \$2.50 each; valued at more than \$8 each, \$3.50 each; and in addition thereto, on all of the foregoing, 55 per cent ad valorem.

367. Watch movements, whether imported in cases or otherwise, assembled or knocked down, if having less than seven jewels, 75c. each [70c.]; having seven and not more than 11 jewels, \$1.25 each [\$1.35]; having more than 11 and not more than 15 jewels, \$2 each [\$1.85]; having more than 15 and not more than 17 jewels, unadjusted, \$2.75 each [\$1.25 and 25 per cent]; having 17 jewels and adjusted to temperature, \$3.50 each; having 17 jewels and adjusted to three positions, \$4.75 each; having 17 jewels and adjusted to five positions, \$6.50 each; having more than 17 jewels, adjusted or unadjusted, \$10.75 each (all above, 30 per cent); watchcases and parts of watches, chronometers, box or ship, and parts thereof, 45 per cent ad valorem (30 per cent) [40 per cent]; all jewels for use in the manufacture of watches, clocks, meters, or compasses, 10 per cent ad valorem (10 per cent); enameled dials for watches or other instruments, 3c. per dial and 45 per cent ad valorem: Provided, That all watch and clock dials, whether attached to movements or not, when imported shall have indelibly painted or printed thereon the name of the country of origin, and that all watch movements and plates, assembled or knocked down, and cases shall have the name of the manufacturer or purchaser and the country of manufacture cut, engraved, or die sunk conspicuously and indelibly on the plate of the movement and the inside of the case, respectively, and the movement and plates shall also have marked thereon by one of the methods indicated the number of jewels and adjustments, said numbers to be expressed both in words and in Arabic numerals, and if the movement is not adjusted, the word "unadjusted" shall be marked thereon by one of the methods indicated, and none of the aforesaid articles shall be delivered to the importer unless marked in exact conformity to this direction: Provided further, That only the number of the jewels which serve a mechanical purpose as frictional bearings shall be marked as herein provided.

368. Clocks and clock movements, including lever clock movements, and clockwork mechanisms, cased or uncased, whether imported complete or in parts, and any device or mechanism having an essential operating feature intended for measuring time, distance, or fares, or the flowage of water, gas, electricity, or similar uses, or for regulating or controlling the speed of arbors, drums, disks, or similar uses, or for recording, indicating, or performing any operation or function at a predetermined time or times, any of the

foregoing whether wholly or partly complete or knocked down (in which condition they shall be appraised at the valuation of the complete article); cases and casings for clockwork mechanisms imported separately; all the foregoing, 45 per cent ad valorem (30 per cent) [40 per cent]; and in addition thereto, upon any of the foregoing articles or parts thereof, having jewels, but not more than two jewels, in the escapement, \$1 each; having more than two but not more than four jewels, \$2 each; having more than four jewels, \$4 each; if without jewels in the escapement and valued at not over \$1.10 each, 35c. each; valued at more than \$1.10 and not more than \$2.25 each, 70c. each; valued at more than \$2.25 but not more than \$5 each, \$1 each; valued at more than \$5 but not more than \$10 each, \$2 each; valued at more than \$10 each, \$3 each; all parts and materials for use in any of the foregoing if imported separately, and not specially provided for, 50 per cent ad valorem: Provided, That all dials, whether attached to movements or not, when imported, shall have indelibly painted, printed, or stamped thereon the name of the country of origin, and the front or back plate of the movement frame of any of the foregoing when imported shall have the name of the maker or purchaser, the name of the country where manufactured, and the number of jewels, if any, indelibly stamped on the most visible part of same; but if such markings are in whole or in part sufficiently similar to the trade name or trade-mark of an established American manufacturer as to be liable to deceive the user in the United States, entry thereof shall be denied if such trade name or trade-mark has been placed on file with the collector of customs.

369. Automobiles, automobile bodies, automobile chassis, motor cycles, and parts of the foregoing, not including tires, all of the foregoing whether finished or unfinished, 25 per cent ad valorem (30 per cent) under \$2,000; above \$2,000, 45 per cent; parts, 30 per cent: Provided, That if any country, dependency, province, or other subdivision of government imposes a duty on any article specified in this paragraph, when imported from the United States, in excess of the duty herein provided, there shall be imposed upon such article, when imported either directly or indirectly from such country, dependency, province, or other subdivision of government, a duty equal to that imposed by such country, dependency, province, or other subdivision of government on such article imported from the United States, but in no case shall such duty exceed 50 per cent ad valorem.

370. Airplanes, hydroplanes, motor boats, and parts of the foregoing, 30 per cent ad valorem.

371. Bicycles and parts thereof, not including tires, 30 per cent ad valorem (25 per cent) [45 per cent]: Provided, That if any country, dependency, province, or other subdivision of government imposes a duty on any article specified in this paragraph, when imported from the United States, in excess of the duty herein provided, there shall be imposed upon such article, when imported either directly or indirectly from such country, dependency, province, or other subdivision of government, a duty equal to that imposed by such country, dependency, province, or other subdivision of government on such article imported from the United States, but in no case shall such duty exceed 50 per cent ad valorem.

372. Steam engines (15 per cent) [30 per cent] and steam locomotives, 15 per cent ad valorem (15 per cent) [45 per cent]; sewing machines (free) [30 per cent] and parts thereof, not specially provided for, valued at not more than \$75 each, 15 per cent ad valorem; valued at more than \$75 each, 30 per cent ad valorem; cash registers, (free) [30 per cent] and parts thereof, 25 per cent ad valorem; printing presses (15 per cent) [30 per cent], not specially provided for, lawn mowers (free) [45 per cent], and machine tools and parts of machine tools, 30 per cent ad valorem (15 per cent) [30 per cent]; embroidery machines, including shuttles for sewing and embroidery machines, lace-making machines, machines for making lace curtains, nets and nettings, 30 per cent ad valorem (25 per cent) [45 per cent]; knitting, braiding, lace braiding, and insulating machines, and all other similar textile machinery or parts thereof, finished or unfinished, not specially provided for, 40 per cent ad valorem; all other textile machinery or parts thereof, finished or unfinished, not specially provided for, 35 per cent ad valorem; cream separators valued at more than \$50 each, (free) [45 per cent on value not exceeding \$75] and other centrifugal machines for the separation of liquids or liquids and solids, not specially provided for, 25 per cent ad valorem; combined adding and typewriting machines, 30 per cent ad valorem; all other machines or parts thereof, finished or unfinished, not specially provided for, 30 per cent ad valorem: Provided, That machine tools as used in this paragraph shall be held to mean any machine operating other than by hand power which employs a tool for work on metal.

373. Shovels, spades, scoops, scythes, sickles, grass hooks, corn knives, and drainage tools, and parts thereof, composed wholly or in chief value of iron, steel, lead, copper, brass, nickel, aluminum, or other metal, whether partly or

wholly manufactured, 30 per cent ad valorem, (20 per cent) [45 per cent]

374. Aluminum, aluminum scrap, and alloys of any kind in which aluminum is the component material of chief value, in crude form, 5c. per lb. (2c.) [7c.]; in coils, plates, sheets, bars, rods, circles, disks, blanks, strips, rectangles, and squares, 9c. per lb. (3½c.) [11c.]

375. Metallic magnesium and metallic magnesium scrap, 40c. per lb.; magnesium alloys, powder, sheets, ribbons, tubing, wire, and all other articles, wares, or manufactures of magnesium, not specially provided for, 40c. per lb. on the metallic magnesium content and 20 per cent ad valorem. (10 per cent) [20 per cent]

376. Antimony, as regulus or metal, 2c. per lb.; needle or liquated antimony, ¼ of 1c. per lb. (10 per cent) [1½c. per lb.]

380. German silver, or nickel silver, unmanufactured, 20 per cent ad valorem (15 per cent) [25 per cent]; nickel silver sheets, strips, rods, and wire, 30 per cent ad valorem.

381. Copper in rolls, rods, or sheets, 2½c. per lb. (5 per cent) [2½c. per lb.]; copper engravers' plates, not ground, and seamless copper tubes and tubing, 7c. per lb.; copper engravers' plates, ground, and brazed copper tubes, 11c. per lb.; brass rods, sheet brass, brass plates, bars, and strips, Muntz or yellow metal sheets, sheathing, bolts, piston rods, and shafting, 4c. per lb.; seamless brass tubes and tubing, 8c. per lb.; brazed brass tubes, brass angles and channels, 12c. per lb.; bronze rods and sheets, 4c. per lb.; bronze tubes, 8c. per lb. (20 per cent) [45 per cent]

382. Aluminum or tin foil less than 6/1000 in. in thickness, 35 per cent ad valorem; bronze powder, 14c. per lb. (25 per cent) [12c. per lb.]; aluminum powder, powdered foil, powdered tin, brocades, flitters, and metallics, manufactured in whole or in part, 12c. per lb.; bronze, or Dutch metal, or aluminum, in leaf, 6c. per 100 leaves (25 per cent) [6c. per 100 leaves]. The foregoing rate applies to leaf not exceeding in size the equivalent of 5½ x 5½ in.; additional duties in the same proportion shall be assessed on leaf exceeding in size said equivalent.

383. Gold leaf, 55c. per 100 leaves. The foregoing rate applies to leaf not exceeding in size the equivalent of 3½ x 3½ in.; additional duties in the same proportion shall be assessed on leaf exceeding in size said equivalent. (35 per cent) [35c. per 100 leaves upward]

384. Silver leaf, 5c. per 100 leaves. (20 per cent) [10c. per 100 leaves] Tinsel wire, made wholly or in chief value of gold, silver or other metal, 6c. per lb. and 10 per cent ad valorem (6 per cent) [5c. per lb.]; lame or lahn, made wholly or in chief value of gold, silver, or other metals, 6c. per lb. and 20 per cent ad valorem (6 per cent) [5c. per lb.]; bullions and metal threads made wholly or in chief value of tinsel wire, lame or lahn, 6c. per lb. and 35 per cent ad valorem (25 per cent) [5c. per lb. and 30 per cent]; beltings, toys, and other articles made wholly or in chief value of tinsel wire, metal thread, lame or lahn, or of tinsel wire, lame or lahn and india rubber, bullions, or metal threads, not specially provided for, 45 per cent ad valorem (40 per cent) [15c. per lb. and 60 per cent]; woven fabrics, ribbons, fringes, and tassels, made wholly or in chief value of any of the foregoing, 55 per cent ad valorem. (40 per cent) [15c. per lb. and 60 per cent]

386. Quicksilver, 25c. per lb. (10 per cent) [7c. per lb.]; Provided, That the flasks, bottles, or other vessels in which quicksilver is imported shall be subject to the same rate of duty as they would be subjected to if imported empty.

389. New types, 20 per cent ad valorem. (15 per cent) [1½c. per lb. on the lead contained therein]

390. Nickel oxide, 1c. per lb.; nickel, and nickel alloy of any kind in which nickel is the component material of chief value, in pigs, or ingots, shot, cubes, grains, cathodes, or similar forms, 3c. per lb. [6c. per lb.]; in bars, rods, plates, sheets, strips, strands, castings, wire, tubes, tubing, anodes, or electrodes, 25 per cent ad valorem (sheets or strips 20 per cent, all other 10 per cent) [sheets or strips, bars, rods, plates, 35 per cent]; and in addition thereto, on all of the foregoing, if cold rolled, cold drawn, or cold worked, 10 per cent ad valorem.

391. Bottle caps of metal, collapsible tubes, and sprinkler tops, if not decorated, colored, waxed, lacquered, enameled, lithographed, electroplated, or embossed in color, 30 per cent ad valorem (30 per cent) [¼c. per lb.]; if decorated, colored, waxed, lacquered, enameled, lithographed, electroplated, or embossed in color, 45 per cent ad valorem. (40 per cent)

392. Lead-bearing ores and mattes of all kinds, 1½c. per lb. on the lead contained therein (¼c. per lb.) [1½c. per lb.]; Provided, That such duty shall not be applied to the lead contained in copper mattes unless actually recovered. [Here follows the usual administration provision—Editor]

393. Lead bullion or base bullion, lead in pigs and bars

(Continued on page 765)

Features of Modern Blast Furnace Practice

American and British Methods and Design Discussed by the Iron and Steel Institute—Variant Opinions on High-Speed Steel
—Recent Molding Sand Investigations

(Special Correspondence)

LONDON, ENGLAND, Sept. 9.—The autumn meeting of the Iron and Steel Institute was held in the ancient city of York on Sept. 5 and 6, and was largely attended. Although York has lost the prominence it once enjoyed as an industrial and trade center, it has of recent years attracted some important manufacturing industries, and, as the headquarters of the North Eastern Railway Co., it remains one of the most vital centers in the network of British railroads. But it is as the capital of the county which is virtually the home of the Iron and Steel Institute that the city was an appropriate meeting place. The president of the institute, Francis Samuelson, who occupied the chair on both days, is a Yorkshireman. The treasurer is of Yorkshire by virtue of long residence, and the list of past presidents contains the names of many Yorkshiremen, including that of Sir Hugh Bell.

The meeting opened with a civic welcome. In acknowledging it the president took the opportunity of pointing out that the bulk of members of the institute are directly engaged in the production of iron and steel and that only a small minority are connected with the scientific side. The president's reminder was timely, for the papers usually presented before the meetings show a greater tendency to discuss purely technical problems than those of a practical character. Thus it is often the case that more interest is taken in informal conversations in the lobbies than in the proceedings in the lecture hall.

Routine business is invariably deferred to the annual spring meetings held in London, and the only business of this nature taken at York was a proposal by the council to alter the method of procedure in the election of a president. This means that a president will be elected for one year, but if it is desired to re-elect the hands of the institute will not be tied.

Modern Blast Furnace Practice

The first paper considered was by A. K. Reese, Cardiff, who described the bases upon which modern blast furnace practice has been built up, and showed how their wider adoption would lead to a very desirable improvement in pig iron production as regards output and economy, in localities where the older practice is still in vogue. In discussing the preparation of the raw materials, Mr. Reese advised the use of uniform size of coke lumps, not exceeding 4 to 6 in., and screened to remove smalls. The crushing of ore to 3 and 4 in. sizes was advocated. The author has long been a user of "dry blast" and believes it has distinct advantages, chief among them the saving secured from being able to employ high temperatures without the usual trouble of sticking. As regards design, Mr. Reese contended that the output capacity of the furnace is in proportion to the effective bosh area. The low bosh is the outcome of attempts to increase outputs by increasing the volume of blast per minute. He enumerated the various advantages of the machine method of handling molten pig iron over the sand-casting method. Mr. Reese characterized the object of modern blast-furnace practice as the attainment of the greatest possible quantity consistent with quality.

[A synopsis of the paper will appear in a later issue.—EDITOR.]

Discussion

PROF. HENRY LOUIS, Newcastle, controverted the author's statement that James Gayley was first to introduce and demonstrate dry blast, in 1904. He believed that the honor of first seeing and using the dry

blast method belonged to England and not to the United States; and in support of his contention he referred to Charles Cochrane's experiments 30 or 40 years back. He (the speaker) characterized as an American idea the author's description of his object as the attainment of the greatest possible quantity consistent with quality, and he urged as an alternative object to be aimed at the greatest possible economy consistent with quantity, for economy and quantity were by no means identical. Mr. Reese advocated the huge blast furnace of 600 tons per day and if he had to produce 1800 tons per day he would put in three blast furnaces. He (Prof. Louis) was inclined to think that it would be far better to put up six blast furnaces, producing half the quantity each. As far as his recollection went the greatest economy, at any rate in fuel consumption, which nowadays was very important, had been attained in furnaces of relatively moderate size. Six blast furnaces would be more expensive plant than three larger ones, but in the manufacture of pig iron the item of interest and depreciation of capital does not bear any very important ratio to the total, and economy in fuel is probably the most important thing to aim at.

GUY BARRETT, Wigan, suggested that small coke was detrimental for more reasons than its size; it very often contained a large proportion of moisture and of ash. Discussing the grading of ores, he was in favor of requiring greater uniformity. With regard to the question of dry blast, he had been informed in the United States that it had been given up and he said that probably no other conclusion could be reached than that the modern practice had not been altogether a great success financially. Speaking of design, he had found that the low bosh gave the best results.

F. CLEMENTS, Parkgate, said he had listened to the paper with just a tinge of disappointment, not because he disagreed with any of the bases laid down by Mr. Reese, but because he was left rather in the dark as to how far those bases were supported by Mr. Reese's own experience. There were three points in the paper which he wished to traverse. The first was relative to the breaking of ironstone. He was in agreement with Mr. Reese as to the logical argument on that point, but it was rather different when they came to consider it from a practical point of view. For instance, at the Staveley and Parkgate works where the amount of ore handled was over 2000 tons per day, containing only 28 per cent of iron, 1s. per ton was added to the cost of ore in handling it. This meant 3s. per ton on the pig iron that was produced. He doubted whether it was really worth while breaking the ore although it was strictly logical. The paper gave eight specific advantages of gas cleaning, and he would ask Mr. Reese how far in his experience the technical results justified the installation of gas cleaners at considerable expense. They were limited in the choice of gas cleaners, and he thought the right type had still to be evolved. He agreed that it was the effective area of the bosh that governed the output of the blast furnace. American practice showed that this law held good in that country as in the home practice.

E. C. EVANS took issue with the author's statement that the reaction of carbon dioxide upon a porous fuel in the blast furnace is wasteful; far from being detrimental he considered it as of the greatest benefit to the blast furnace man. He believed that the use of such a coke will result in a considerable diminution of temperature at the top of the furnace; it will lower the swing of reaction in the furnace. He considered

that the main factor is not so much the porosity of the material as the character of the pores, and the fore-saw a radical change in the economic production of pig iron by the use of a fuel with the burning qualities of charcoal.

W. J. FOSTER was of opinion that much of the coke was not dense enough; what is required is a dense coke to correspond with the beehive coke in the matter of hardness. In grading materials he would give preference to the size of the coke and limestone rather than the ironstone, as the latter melted above the bosh line. In 1907 he discussed Mr. Gayley's paper and later discussed the subject with him in America and he (the speaker) thought that what he had discovered in respect to effective calories in those days in the use of the dry blast was very nearly what they found in practice today.

J. H. HARRISON, Middlesbrough, emphasized the importance of the right distribution of materials in the furnaces. His view was that the diameter of the bell should be half the diameter of the throat, and they found in Cleveland that the best results had been obtained in furnaces of this type.

H. K. SCOTT urged that a great responsibility rested upon the owners in the matter of putting in proper equipment for the working of blast furnaces.

C. H. RIDSDALE considered that every blast furnace manager should be able to understand and work out heat balance sheets, otherwise he could not expect to get the best results.

MR. REESE, replying to the discussion, took up first the comments of Professor Louis. The latter had not agreed that the greatest output consistent with quality was the object of modern blast furnace practice, and his idea was that they could not get a low fuel consumption or fuel economy with large outputs of pig iron. The speaker suggested that if Professor Louis would consult some of the results obtained in later years in the United States with furnaces making 700 tons a day he would find that the fuel consumption ran as low as, if not a good deal lower than, anything done in this country under the old practice. Within the last three months details had been published of the results from a modern blast furnace, one of the most recently built in the United States in which the fuel consumption was very low, something like 16 or 16½ cwt. per ton, with outputs of 700 and 800 tons a day for a short period. That compared favorably with anything that could be done or had been done in the slow driven old type of furnace. Professor Louis spoke of enormous furnaces, but the speaker wanted to point out that the furnaces in which these practices were carried out were not enormous. They reached 85 to 90 ft. in height, and there were many furnaces under the old practice that were 85 feet in height and a few were built of 100 to 105 ft. That practice had died out and 85 to 90 ft. was the standard size for modern blast furnaces. So there was nothing very enormous about them. The internal volume of the furnaces was a good deal smaller than that of the old furnace of 80 to 85 ft. under the old practice. They were now much smaller in their diameter. He had no doubt that large output had a very decided effect on economical output, because it divided cost of fixed charges, reduced labor costs and everything but the cost of raw material and fuel. Under the new practice the fuel consumption was unquestionably much lower in proportion. It was as low as it was under the old practice and had all the other advantages of the high output from a single furnace. With regard to the size of the ore, the usual practice was to break it down to 3 in. long, the degree depending somewhat on the characteristics of the ore. A very dense ore could be usefully broken down to 2 in. In his opinion and experience an ore ½ in. in size was not a fine ore, and even ¼-in. ore would work well in a blast furnace. It was the fine dusty material that caused the difficulty. Mr. Barrett had asked some questions about the crushed ore being placed in the rotary. In northern New York State it was done as a regular thing and the ore was roasted. His answer to Mr. Clements on the point of crushing ore was that he did not know what he got out of his furnace. It would pay him a good deal more than 3s.

a ton when he put ore that size into his furnace if he was going to adopt modern practice. Mr. Evans had put forward a question by which he suggested the possibility of a very radical change in the economic production of pig iron. It was so radical and his claim was so enormous that it was beyond the present discussion, but he suggested to Mr. Evans that the proper thing for him to do, having confidence in his convictions was to produce a sufficient quantity of his "char-coke" (as he would term the new material) to test it properly in a blast furnace. He would recommend that Mr. Evans should do that in a blast furnace operated under modern conditions and not in one of the older type. There had been several references to his statement that it took approximately a quarter of the weight of coke to simply take care of the slag. Apparently the gentlemen had misunderstood. They seemed to have an idea that a fourth of the coke in the furnace was required to take care of the slag. But his statement was that 25 per cent of the weight of slag produced was required in coke. How much coke was required depended on how much slag there was.

Molding Sands

C. H. W. Holmes presented a paper describing his investigations with a view to estimating quantitatively the effect produced upon the essential properties of sand by the various processes to which molding sands are subjected. A large increase both in bond value and in mechanical strength occurs after milling and disintegration of the sands. The author concluded that the mechanical and physical properties of sands for gray iron founding are equally important with chemical analysis; that the bond absorption value obtained in the raw sand may be greatly modified by mechanical treatment, and that the most successful molding sands contain both static and mobile bond.

Discussion

Several speakers suggested that too little investigation of foundry sands had been conducted in Great Britain and that in particular the difficulty of mixing sands had not received sufficient attention.

J. E. FLETCHER directed attention to the difficulties in mixing sands. When once sand had been deposited under watery conditions, and the wet sediment dried off, and an attempt was made to mix those constituents, a very difficult proposition presented itself. In many cases the use of water in mixing is responsible for a great many of the molder's troubles. The use of the die was undoubtedly a qualitative sort of test, but to him it did not yet seem quite satisfactory, as in some cases the absorption tests had not quite borne out the hope that had been formed of them. He asked whether the author had tried the circular transverse test as against the square one.

DR. W. H. HATFIELD considered that what was of more interest to the iron and steel industry than the various physical and mechanical properties of sands was that there should be devised simple, ready and effective methods of determining the suitability of a given sand for the manufacture of steel castings or cast iron. After all, the actual casting operation was an empirical test and the only test which hitherto was able to demonstrate successfully for them the real merit of a sand. Some years ago, he noticed in the Pas de Calais a foundry working actually on the sand dug up in the next field. That sand was simply carted into the works, milled, and then used as a green sand in the making of excellent steel castings. The various methods of investigating sands were incomplete until there were some quantitative forms of test which could show without the casting operation the suitability of a sand.

ISAAC LESTER said that the only good test of a casting was the casting itself and what it did. The same applied to molding sand—if a sand was good enough for a certain casting, let them keep on using it; if it was not, then it should be discarded in favor of some other.

H. SCOTT asked the author whether he was working in conjunction with investigators in the United States and whether he had synchronized his method of

investigation with the methods in vogue across the Atlantic. He uttered a warning that before carrying on this investigation, some effort should be made to discover whether people who were working on similar lines were in fact working with similar materials and similar dimensions.

MR. HOLMES in reply said that the average foundry was very badly equipped as regards sand preparing machinery, and he predicted that sand preparation would be revolutionized to a great extent in the next few years. He hoped some day to devise the simple methods advocated by Dr. Hatfield but he was afraid that day was a long way off. In regard to the suggestion on standardization, as far as possible he had adopted the methods used by American workers. The transverse bar as he had taken it in his experiment was used by Hanley and Simmons, who were, he would say, among the leading workers in America. The reduction of bond by coal dust and the possibility of getting a variety of coal dust that would be successful in use and would reduce the bond as little as possible opened up a big field of its own. Detailed work on sand at the present time was so very wide and one had so little help in the meagre work which had gone before that the position was rather appalling. If they cast an article in a sand that had a good deal of coal dust in it they could see just above the surface of the metal, the gas actually coming off.

High-Speed Steel Work

H. K. OGILVIE, Coventry, described the practical details of the manufacture of high speed steel in the basic-lined electric furnace. The advantages of this method over the crucible were detailed and the refining action of the electric furnace method commended. The charge used generally consists of high-speed steel scrap, with a small amount of turnings. Heavy clean scrap with high tungsten content was most economically used, and light or rusty castings rejected. Ten per cent of loss occurred in melting, which might rise to 20 per cent with more turnings. Good steel could be made in a 3 or 4-ton furnace in about $4\frac{1}{2}$ hours from starting. The use of ferrosilicon was found to obviate the tendency of the steel to rise in the molds when cast. The file and Brinell hardness tests were not considered satisfactory, as rapid means for testing the cutting hardness of hardened high-speed steel. Both may serve to separate material within fairly wide limits, but cases are numerous where one method of testing gave quite different impressions from another. Scratch and rebound hardness tests do not give consistent results and even magnetic and electrical tests have not succeeded in solving the problem of a good rapid test for this steel.

Discussion

C. G. CARLISLE, Sheffield, thought the author made rather an illogical statement when he said that steels properly made by the crucible and the electric method seemed to be equally good. Then Mr. Ogilvie proceeded to say that it sometimes happened in the crucible steel process that small particles of tungsten powder have not been completely melted. Obviously if it was not melted in the crucible, the two processes were not equal, and seeing that the electric furnace was capable of melting tungsten powder the electric furnace must be the better. Mr. Ogilvie rather fell into the error of a specified time limit for his charges. He said, "In any case the time should not exceed $4\frac{1}{2}$ hr. for a 3 or 4-ton furnace." It was rather a tall order to say "in any case" in connection with an electric furnace. Many things might happen and did happen, which stopped any calculation as to what time they were going to get the heat out. It was all right to discuss the time limit when they had got the heat out, but previous to that it was best to leave that alone. Members who had the commercial instinct to the fore rather than the technical instinct preferred to talk about time limits. The metallurgical problem that Mr. Ogilvie set for himself there, and which he did not solve, was the gas trouble he mentioned. There was no electric furnace-man who had not passed through that stage and been

exasperated by it. Mr. Ogilvie said there was gas trouble and then proceeded to say that the slag was all right. He (Mr. Carlisle) contended that the slag was not perfectly all right when there was gas trouble. First of all was there overoxidation of the bath? The furnace firer might be contending with some carbon difficulty. He wanted to reduce the carbon in the bath and by an oversight he had too much oxygen in the form of oxide of iron which was not pulled out and was left there at the time he raked his slag off, persisting throughout the subsequent refining. Then another and obvious error crept in, and that was in the refining slag when he did not obtain sufficient fusibility of his slag at an early stage. The consequence of that was that they got the electric arc to play on the slag. If they had got the slag too limey and with not sufficient fusibility about it they had the direct arc playing on the bare metal, and they got the lumpy slag without any coating of thin slag to protect it. In consequence they might get overheated metal and fiery metal and one that gave trouble in the molds. His method of cooling was one that he (Mr. Carlisle) had had to adopt on occasions and which was almost always successful. He could not understand re-action except that it must throw out oxide in solution. He was rather surprised to find that Mr. Ogilvie did not anneal his billets after forging and before he ground them. In Sheffield a good deal of high-speed steel was spoiled during the war through being in too much of a hurry, and through grinding billets that were not annealed. If they began to grind a small crack without hardening the billet, they simply made it worse. If it was in somewhat hardened condition they made it rather better by grinding. Mr. Ogilvie forgot to anneal or temper his machined tools before hardening. He remembered a machine tool firm which was very persistent but finally yielded to advice and found that they were much more successful than hitherto in obtaining good tools without any danger of cracking through annealing or tempering before finally hardening.

H. BREARLEY, Sheffield, thought the economic basis of the process described by Mr. Ogilvie, was not quite clear. Some of the conclusions seemed to him extremely doubtful. Mr. Ogilvie referred, for example, to the cost of billets per ton, but whether he melted the metal in an electric furnace or in the crucible was not clear. As he did not tell the kind of crucible furnace he was comparing with the electric furnace, obviously his comparison was not of very much value. In Sheffield, at any rate, in pre-war days, the cost of sound bars, things like tool steel, high speed steel and so on was pretty much the same whether the material was melted in a gas-fire crucible furnace or an electric furnace. Of course if the author were making comparisons with coke he dared say they would be in favor of the electric furnace. It was considered, or used to be in Sheffield, that the only way to put tungsten into high speed steel or any other kind of tungsten steel was in the form of tungsten powder. He was very glad to see that a comparatively young man in Coventry had risen to tell them that it was a wrong thing to do and that they should use ferrotungsten. He was inclined to agree with Coventry on that. He did not understand the author when he said that "To attempt to make good high speed steel from turnings alone, or where the greater part of the charge consists of turnings, is not in this country commercially possible." He did not understand why it should not be possible in this country if it was possible anywhere else. It was explained further on in the text that one of the difficulties was that some of the turnings were greasy and would probably carbonize and that some of them were rusty and would probably oxidize the melt. He could not understand why it was not possible to mix part of the rusty turnings with part of the greasy turnings and so ease things up. There was one other thing in Mr. Ogilvie's paper that was extremely interesting. He told them about a low tungsten chromium steel which, although it had a Brinell hardness of 650, was easily filed. In the same tungsten chromium steels in which the Brinell number

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ESTABLISHED 1855

THE IRON AGE

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Commercial Conditions Not Bad

The average observer feels that there is much in present commercial and industrial conditions to be regretted. On the basis of pre-war standards and viewpoints the feeling is justified, but from the broader and newer viewpoint we plainly see that the clouds have silver linings.

The steel industry feels that it has reason to complain of its rising costs and inability to operate at an efficient rate, but if the industry were miraculously put in the position of being able to operate at its full capacity it would probably find itself faced with very unsatisfactory market prices. The industry is almost bewildered by the succession of "troubles" it has had. Before the war it was practically always able to operate at capacity when it had a sufficient order book, but this exception was an important one, and for quite a while prior to the war the periods of relative inactivity were tending to lengthen, at the expense of the periods of great activity.

Relations between employers and employees are considered as being on the whole unsatisfactory, but they were also unsatisfactory before the war. The most important difference is that before the war there was no very rapid trend toward improvement, while in this post-war period improvement is being forced. At some points there seems to be a trend in the wrong direction, but in such cases a righting will necessarily be forced. It is better to bring things to an issue.

The coal situation is not wholly objectionable. Circumstances that have made the present situation were in existence before the war and presumably would have made trouble sooner or later had there been no war. It is inconceivable that a satisfactory solution will not be worked out in time. The solution may perchance be one that will run counter to the wishes of many men, as to the part the Government should play in industry and commerce, but all experience shows that when men are forced to change their opinions they prove more adaptable than had been imagined.

The episode of the railroad shopmen's strike now appears after all to prove rather a vindication of the Transportation Act than an accident requiring

a reopening of the whole subject. Certainly the act has not scored a failure. It may not be working altogether so well as expected, but it has a vastly more difficult labor situation to meet than any that existed before the war.

Dissatisfaction that the Government has not been more helpful to business since the Armistice should be tempered by reflection that business has shown its resourcefulness by getting along without such help. It is easy to recall the amount of talk there was just before the Armistice that a reconstruction program was absolutely necessary, and it is very pleasant to reflect how much trouble we have escaped by failing to try to impose any program upon business. While the legislative department of the Government has done little constructive work, the Treasury Department has done remarkably well, so well that few men have bothered themselves noticing that fiscal problems of very serious importance have been smoothly and perfectly solved. The advantage that American business enjoys by the Government's finances being in such excellent condition is incalculable.

German Steel Industry To-Day

New light on the present capacity of the German steel industry is given by statistics recently made public and published in THE IRON AGE last week. While only total pig iron and steel production for 1920 and 1921 are set down, with no details, it is the first information that has come out of Germany regarding these two years.

Steel output is returned as 725,000 gross tons per month for 1921, as compared with 1,445,000 tons per month in 1913. Assuming that Germany lost about one-third of its steel-making capacity as a result of the war, then the production last year, which was about one-half that of 1913, is a significant achievement under all the circumstances, representing an increase of nearly one-third over 1920.

In pig iron the comparison is not so striking. At 508,000 tons per month in 1921, the rate is about 37 per cent of that in 1913. Of interest also is the wide spread last year between the pig iron and steel production as compared with 1913, and even

with 1920, steel output in 1921 exceeding pig iron by a larger margin than in any of the years under review. One explanation is the much larger use of scrap in German furnaces. In 1920, taking importations as a basis, scrap receipts were only 8371 tons per month, increasing to 21,901 tons per month in 1921. For the first half of this year, however, these importations averaged no less than 39,782 tons per month and 75,162 tons was received in June. The liberal use of scrap in steel making is not confined to Germany; it is a marked feature of open-hearth operations in the United States, Great Britain and other countries.

In 1913 and 1914 Germany stood second only to the United States as a producer of pig iron and steel, and that is her rank to-day, four years after the end of the great war. As a factor in world competition Germany is still to be reckoned with, the alternative of her political and industrial collapse being unthinkable, in spite of the débâcle in the mark which has led to so many gloomy predictions in recent weeks. Thus far in 1922 she has been second only to Great Britain as an exporter of steel.

Cycles and Current Phenomena

The two general methods of forecasting the future in commerce are by consulting the cycles and by considering the current phenomena. Of late we have been giving much attention to the business cycle, which is now rather popular. The chief objection to the cycle method is that the cycles are not of predetermined length and extent. Taking bank clearings for illustration, we do not know how long it will be from one low point to the next, nor, when the clearings increase, do we know in advance what the maximum will be. We know when we have passed the peak, but we do not know when we are closely approaching the peak.

More illumination could be obtained from current phenomena if there were more careful study of them. It can hardly be denied that usually there is very loose thinking on the subject. A rather substantial proof is the great vogue for many years of the digest that catalogues first the "favorable" and next the "unfavorable" items. The inference is that the "favorable" items are all of the same character, and similarly with the unfavorable. One may well suspect that the writers of these digests so feel, and it is obvious that such is the impression made upon the reader.

Yet in these digests items of widely different character are included. One just published mentions, as co-ordinate, that "banking and credit conditions are wonderfully good" and that "prices of many manufactured products are advancing." Both these indications may be good or encouraging, but a subject of this sort is worthy of more careful study. The two items are quite different in character. It is conceivable for banking and credit conditions to remain good for an indefinite period, while it is patently impossible for prices to continue advancing indefinitely. This same digest mentions as favorable that the country has "apparently passed safely" through the coal strike. That statement deserves study and analysis. It is not to be taken simply as a favorable vote for better business in future. It is

good that the coal strike is settled, in the sense that the country is better off with the strike settled than it was during the strike, but it is not better off with this particular settlement than it would be with a different settlement, or than it was when coal miners were not being paid an unfair proportion of the country's total income.

In another review there are named among other favorable factors the building boom, the activity in automobile construction and the abundant crops. Probably the writer did not regard these items as co-ordinate, but the reader, whom it is desirable to educate, is likely to receive that impression. If we are to study economics for enlightenment and improvement in judgment, such items should be considered in detail. The abundant crops are an economic advantage, there being so much more of this world's goods for us to enjoy. The very phrase, "great building boom," used by the writer of the review is disquieting. A "great boom" suggests that men are paying too much and are not getting the worth of their money. The farmers do a certain amount of work in the year, and if that work produces large crops we are better off than if it produces small crops. A "great building boom" suggests precisely the opposite—that the results are small, instead of large, in proportion to the time the workmen put in.

The "unfavorable" items catalogued from time to time also deserve analysis. One current review mentions as "unfavorable" that "building activities are expected to decline with rents." We are here to live in houses, not to build them. It may not be good for carpenters, but it is better for the nation to have enough houses than not enough.

Carefully studied, the current phenomena will illuminate the future, but making two hodge-podges, one of "favorable" and the other of "unfavorable" phenomena, is not conducive to straight thinking and safe conclusions.

Is Welfare Work Overdone?

One factor in the readjustments made during the recent depression was what has been termed the liquidation of welfare work in industrial establishments. In many cases this phase of management had passed reasonable bounds. Even before the slump in business compelled curtailment not a few employers had been looking askance at what had been developed in the effort to procure and maintain contentment and esprit de corps. In some instances owners had made of their welfare departments a hobby; funds being ample, they had ridden the hobby much further than they had realized. In other cases there had been a rapid growth to formidable proportions in the competition for labor in a market where the supply was much under the demand. Another influence was the employment of specially trained men and women to conduct the department. Naturally they were altruistic in their aims.

In cases where the system was carried too far an unfavorable reaction had begun to be felt. Employees, among themselves and outside, had openly expressed the wish that some of the welfare money might better be spent in wages, though probably few of them at that time thought that

wages were low. Then came dull times, and this being an expense that could be dropped quickly, the item was eliminated in many establishments, with the double satisfaction of effecting needed economy and of getting rid of a top-heavy burden.

Whatever the motive for industrial welfare work, whether it be philanthropy or cool-headed business or both, as is usually the case, the aim is the same—to keep men and women cheerful of mind, strong of body, loyal to the firm. Naturally when this condition exists it spells efficiency of production and reduced overhead, notably in labor turnover. But in the past few years it has been proved that the system may defeat its own ends and result in a measure of discontent. Much of the means of securing contentment, such as well-lighted, well-ventilated working places, with accident hazard reduced to the lowest possible point, does not class with welfare work. The same is to be said, too, of the hospital or infirmary, with the shop physician and nurse, and some other things which in their beginning were established from kindly rather than from business motives.

The real welfare work has many sides—the recreation and athletic field and athletic teams; garden plots; recreation hall, playground for employees' children, restaurant; house building plan, in which the company assists in financing the establishment of a home; group insurance, thrift-encouraging projects; Americanization classes, part-time classes for the training of boys and girls, and evening classes for any who may care to join them; clubs to bring together employees having some common interest—and so on through a long list of activities. Every one of them is a good thing, in its place, when carried forward wisely and not extravagantly.

The trouble comes from attempting too much, if one is to judge from recent experiences. Every industrial plant is the better for the introduction of some phase of the work, but there are few that can carry them all. It should be recognized as a fact that such a system may become an actual burden to workers. They are offered too much and feel a sort of duty in accepting, until a good part of the time they have to themselves is eaten up in affairs auxiliary to their labor. They have lost the spontaneity of their recreation.

One genuine evil has crept into some of the welfare systems, particularly in connection with athletics. A ball nine or football team is organized from among the regular employees. As competition gets keen with rival works or departments, men begin to be hired with fully as much attention to their athletic skill as to their expertness as workers. The next step is hiring athletes, or it may be musicians for the band, or other specialists, and giving them sinecure jobs. Fellow employees do not like that. Men resent working hard at their daily tasks side by side with one who not only is not up to his job, but is permitted to soldier at will. Thus the purpose of creating shop spirit by a common pride in the ball nine, for example, is frustrated. It would be better to hire professionals without pretense of giving them other employment. But, give a man a nine or a crew made up of bona-fide workers, his own friends, and no more ardent partisan could be

asked for when the shop turns out to see the game. It is a good rule for an executive, that the aim of his welfare department is to better the employees' condition and not to add glory to the name of his company or to his own department.

CORRESPONDENCE

Income Taxes and Industry

To the Editor: Your recent editorial entitled "Uneven Tax Burdens" is in a sense rather misleading. If, for example, the people of New York State actually produced the income which furnished 25 per cent of all taxes collected by the Bureau of Internal Revenue, then your conclusions would be sustained.

However, such is not the case. New York is the center of large corporate interests whose properties ramify throughout the United States. Thus, for example, taxes are paid in this State upon the wealth produced by the development of oil in Oklahoma, or copper in Arizona. These examples could be multiplied indefinitely. If taxes were distributed back to the States where the actual production occurred, there would be decided leveling up of the revenues complained of.

Furthermore, the regions most heavily taxed are those of greatest industrial development. Naturally they contain the greatest amount of invested capital and have the largest means of production. Taxes, like wages, must in the last analysis be paid out of the wealth created in this way. It is difficult, therefore, to comprehend a system of taxation which would not take its largest toll in the regions of greatest production.

If, on the other hand, taxes were levied on consumption rather than upon income, the showing based upon population would be more uniform, but not equal. Consumption is always greatest where production is greatest and the same regions would still pay the largest share of the tax.

In this connection another serious question can be raised. Would not a direct consumption tax result in the decreased use of commodities, so that the market for the products of the now "unhampered industry" would be destroyed?

ALWIN SCHALLER,

General manager McEwen Brothers.
Wellsville, N. Y., Sept. 6.

Lower Rates on Pig Iron from Sheffield and Florence, Ala.

WASHINGTON, Sept. 19.—The Interstate Commerce Commission last week declined to suspend the Arrow Transportation Co. river-and-rail rate on pig iron from Florence and Sheffield, Ala., to points north of the Ohio River on the basis of \$1.96 per ton to Metropolis, Ill., for river transportation and \$2.26 from the river to Chicago, the rail movement being by way of the Chicago, Burlington & Quincy Railroad. This makes a rate of \$4.18 from the furnaces in Florence and Sheffield to Chicago and \$3.28 to St. Louis. The tariff was opposed by some Chicago interests and was supported by interests in southern Ohio and St. Louis. The tariff became effective Sept. 15.

The Attorney General of the United States has called the attention of the metal trades to the fact that throughout the country there are many instances in which manufacturers of metal badges, worn usually by officers of the law, have made or sold to unauthorized individuals metal badges purporting to be official insignia of Government officers. As a result of the promiscuous sale of such badges, many individuals have been arrested, charged with the false impersonation of Federal officers. A manufacturer of badges may be subjected to liability or at least to embarrassment because of the manufacture and sale of badges to unauthorized officers.

Car Shortage Follows Strike Troubles

Delivery of Iron and Steel Plants Delayed as Plants Resume
—One Hundred Thousand Men Are Idle Owing
to Closing of Ford Factories

YOUNGSTOWN, Sept. 19.—In the Mahoning Valley the steel industry shows evidences of rapid recovery from restrictions on production imposed by the railroad strike. Lack of suitable cars is still a deterrent, however, and is impeding shipments of finished steel to some extent. One sheet interest, for instance, reports that it has approximately 3000 tons of sheets held up on its shipping platforms or in its warehouses by inadequacy of car supply. All of this tonnage represents business against which consumers have issued shipping instructions, and it is ready to go out as soon as cars are available.

Lack of cars is likewise retarding coal shipments in some measure. In shipping sheets and wire products, refrigerator cars have been employed for shipment direct into Chicago. In other cases, open top cars are being used, but the material is protected as much as possible against the weather by coverings.

Blast Furnace Operations

Of the 47 blast furnaces in the Youngstown district, 23 are now pouring, representing in excess of 60 per cent of the total iron capacity. On Sept. 14, the Republic Iron & Steel Co. turned the blast on a fourth stack in its Haselton group, while on Sept. 13 the Brier Hill Steel Co. started its third stack, and the Trumbull-Cliffs Furnace Co. its stack at Warren. In the Shenango Valley, two furnaces are being modernized by the William B. Pollock Co., and their capacity enlarged, one for the Sharpsville Furnace Co. and the other for the Shenango Furnace Co. A new stack of 400 tons capacity is being built for the Sharpsville Furnace Co., and a bin system installed for handling ore. The furnace of the Shenango Furnace Co. will be 500 tons capacity.

The Warren stack of the Trumbull-Cliffs company is producing basic iron, while the Republic company's latest active furnace is on Bessemer iron. In consequence, the company's Bessemer department, idle during the last 18 months except for brief and intermit-

tent operation, resumed on Monday, and constitutes the most important addition to active Valley steel capacity this week. For the first time in many months, all four Bessemer departments in the Mahoning and Shenango Valleys are active, two operated by the Carnegie Steel Co., one by the Youngstown Sheet & Tube Co. and the fourth by the Republic company.

Mattie blast furnace of the A. M. Byers Co., Pittsburgh, will be blown in at an early date. No. 1 puddle mill of the company's plant at Girard, Ohio, resumed Sept. 15. It consists of 44 units. It is expected other furnaces in this territory will get under way before the end of September. Until the rail strike interfered with coal shipments, 26 of 47 stacks in both Valleys were pouring last Spring.

Steel Plants and Mills

Ingot capacity of the district is operating at 80 per cent. In the Mahoning Valley 45 of 51 independent open-hearth furnaces are charged. Six merchant bar mills are active, besides the finishing mills of the Carnegie Steel Co. at its Upper Union and McDonald plants. The Republic company has its large merchant mill at Haselton under power, and four smaller bar mills at its Brown-Bonnell works. The Sheet & Tube company's merchant bar mill was also scheduled to resume. This represents the highest bar mill operation in many months.

Tinplate production is an exception to the upward trend, the Liberty plant at Leavittsburg of the Trumbull Steel Co. being idle. The tin mills at its Warren property are active, however, while the Falcon Tin Plate Co. is operating its Canton plant on a normal production basis.

The Valley's sheet industry is practically on a normal basis, with 108 of 113 mills scheduled. The increase over last week is due to the additional mills operated by the Sheet & Tube company. This company and Republic are dividing 15 active pipe furnaces, out of a total of 17.

Manufacturers Confer—President Campbell Predicts Ample Supplies When Late Season Ends

WASHINGTON, Sept. 19.—The iron and steel and all other industries of the United States as well as the household will have adequate supplies of coal and prices will be lower after the navigation season on the Great Lakes closes, in the opinion of President James A. Campbell of the Youngstown Sheet & Tube Co., Youngstown, Ohio. This view was expressed to THE IRON AGE by Mr. Campbell last Friday when with other iron and steel executives he participated in the conference of business men regarding the bituminous coal situation held at the Department of Commerce. The meeting was made up of officials of the United States Chamber of Commerce, the American Railway Association, the National Association of Manufacturers, the National Association of Purchasing Agents, and the Public Utility Associations, who conferred with Secretary of Commerce Herbert Hoover, H. Foster Bain, director of the Bureau of Mines, and C. B. Aitchison of the Interstate Commerce Commission. The opinion of Mr. Campbell accorded with the general view of the conference.

Public Unduly Alarmed

Mr. Campbell said that there has been an undue alarm on the part of the public on account of the coal

situation. He predicted that there would be a scarcity of coal until the lake navigation season ends and that high prices would prevail until then. But after the closing of navigation, he said there will be plenty of coal to take care of industry and households and that prices will be lower. He pointed out that it now is a question of railroad transportation, but that the railroads have placed tremendous orders for cars and locomotives and that the coal strike being settled and the rail strike being virtually over, the outlook is cheerful. It is to be expected, therefore, that after the Northwest has been supplied with its coal requirements, fuel will move in abundant quantities to industries and that increased production in steel and other lines will follow.

Lower Prices Expected

The conference itself went formally on record as believing that the natural processes of increased supply, provided distribution is facilitated, will bring down the price of coal and assure complete supplies to the householders and industry. A definite pledge on the part of commercial interests to aid in expediting those natural processes and determination on the part of the Government that advantage shall not be taken of

the recent strike in an effort to exact high coal prices from the public were evidenced at the conference. One of the most interesting points discussed was the question of priorities in the coal movement. In this connection, relief to the iron and steel and other industries, which are not on the preferred list, was indicated by the opinion of the meeting that mobility will be given to movement with less opportunity for speculation if the priorities to special uses which have been necessary prior to the re-opening of the union mines should be relaxed and priority parallel with agricultural produce should be given to the movement of all coal without discrimination as to consignees. It was also pretty generally the opinion of the meeting that all re-consignment rights upon coal should be abolished in order to prevent speculation in coal. This prompted the decision to organize special committees under the leadership of the Chamber of Commerce of the United States to advance these purposes.

Purposes to be Carried Out

The three major purposes for which the conference voted to organize voluntarily campaigns, were as follows:

1. To induce manufacturers, utility corporations, and buyers generally not to purchase coal beyond their day-to-day needs until the flow of coal becomes more normal.
2. To persuade holders of coal contracts not to call for delivery on those contracts past their day-to-day needs. It was considered that above one-half of the coal in the country is under contract at normal prices and that a relaxation in the demand for this coal to the minimum daily requirements would allow an increase in supply to the general public.
3. To expedite the movement of coal in every possible way.

Secretary Hoover's Views

In opening the conference, Secretary Hoover said it was most desirable that re-adjustments in prices and distribution should take place by natural means of increased supply and the holding down of consumption pending such increases. Production for the public must come, he warned, by one means or another.

The Secretary stated that while the bill pending in Congress would give powers to embargo shipments of extortionate priced coal moving in interstate commerce, the Federal Government could exert no constitutional control over coal produced and sold within State boundaries or over-speculation in interstate coal, once it had reached its destination. Many States were taking drastic legislative powers in these domestic matters and unless the situation quickly improved, no doubt many more of them would do so in order to protect their citizens.

It was agreed that the mines had ample capacity, even to the point of surplus, to meet the situation, that the problem was wholly one of transportation, and that the price would ameliorate if transportation could be increased and if in the meantime consumers would purchase only for their immediate needs.

Losses Overestimated

On the day preceding the conference, Secretary Hoover said that while the losses to the country, due

to the two great strikes, are considerable, they are easily overestimated. He stated that the estimate of current coal miners' wages lost in the five months, is not a correct basis of estimation, because over a period of 18 months "we will probably consume approximately the same amount of coal." In other words, the Secretary pointed out, the miners will work more days in the week and produce more coal in the next six or eight months than they would have produced if there had been no strike, and thus the wage roll the next six or eight months will be larger and will, in a considerable degree, compensate the loss during this suspension.

Secretary Hoover added:

Farmers Are Heaviest Losers

"The real loss would lie more in the loss of productivity in industries that have, or might have, to close down as a result of the coal strike. If all of our industries can be kept in motion, the loss will be much less from the coal strike than is currently estimated.

"The greatest loss to-day is the one being met by the farmer as a result of the railway strike. The export of farm produce has been seriously interfered with by the inability of the railways to transport produce. Prices are therefore unduly depressed in the agricultural regions and the farmer is suffering grievously.

"The inability to transport manufactured products will create some degree of loss, but not so serious as that to agriculture.

"There are other losses that must be counted into the National balance sheet, such as the damage to the railways, the extra charges which they have been put to, the cost of keeping the mines open and maintaining them during the period of suspension, and a hundred other items that are of importance. In the broad view, however, if we can get back to business, if we can secure a resumption of transportation and rapid distribution of coal and agricultural produce, we will not have received such an economic wound as cannot be very quickly recovered from. We will probably not be on such a high plane of business prosperity during the next six months as we would have been, had the strikes not taken place, but we will undoubtedly be on a much higher and much more comfortable plane than that of last year."

Those in Attendance

Among those who attended the conference on last Friday were the following:

- James A. Campbell, president Youngstown Sheet & Tube Co., Youngstown.
- E. A. S. Clarke, president Consolidated Steel Corporation, New York.
- Harry Coulby, Pickands, Mather & Co., Cleveland.
- R. P. Lamont, president American Steel Foundries, Chicago.
- A. A. Landon, vice-president American Radiator Co., Buffalo.
- Charles K. Foster, vice-president American Radiator Co., Chicago.
- S. M. Vauclain, president Baldwin Locomotive Works, Philadelphia.
- J. E. Edgerton, president National Association of Manufacturers, Nashville, Tenn.
- Alexander Legge, president International Harvester Co., Chicago.

Ford Furnace Plant Operating on a Reduced Scale

DETROIT, Sept. 18—The Ford layoff became an actuality Friday night when several thousand men reporting for duty at 11 o'clock at the Rouge plant were ordered to turn in their tools. A few were retained at the foundry, coke ovens and blast furnaces. The night force at the Highland Park plant were released early Saturday morning so that by Saturday night the suspension of Ford manufacturing in Detroit was complete. This means that approximately 70,000 men in Detroit have been thrown out of work at the Ford plants and another 30,000 employed by companies dependent upon Ford production will likewise be idle, making a total of 100,000. A conference of Ford executives held Friday afternoon was for the purpose of determining whether it would be possible to keep part of the plants in operation. The coal situation is ad-

mittedly better but no statement has been made by the Ford officials as to whether their fuel situation would have permitted a continued operation.

Although definite announcement was made about three weeks ago that the Ford industries would close on Sept. 16, considerable doubt existed until the last moment as to whether this program would be carried out.

The Ford blast furnace and coke ovens are in operation on a reduced scale. Probably 10,000 to 15,000 men were retained at both plants. Highland Park and River Rouge parts manufacturers are feeling the effects and reducing working forces. There are numerous predictions that the shut-down will not last more than three weeks. No statement has been made by the Ford Motor Co.

It is significant that reports from the members of the Detroit Employers Associations show very few increases in employment, figures for the week giving 175,800 which is a decrease of 2,200 as compared with 178,000 employed a week ago.

The General Motors plants in the State of Michigan have shown no signs of reducing their production schedules and Arthur T. Waterfall, vice-president of Dodge Brothers, announced Friday that this company is running to capacity and does not expect any retrenchment.

Efforts to Unionize Connellsville Miners Fail

UNIONTOWN, PA., Sept. 18.—Increased production was the feature of the situation in the Connellsville bituminous region last week. This is being brought about by the importation of hundreds of additional workers and increased efficiency on the part of the men who have been coming into the region during the past few weeks.

Efforts at unionization of the Connellsville field have failed. The developments of the past week have strengthened the situation as pertains to the larger operations and it is not believed that another single operation will affiliate with the union.

Evictions in the various plants continue with increased force. At one plant, 40 persons about to be evicted went to the management and asked to return to work. They are working and are still in their houses.

Action of the United Mine Workers in sending a telegram to the United States Senate through Senator Tom Watson asking for an investigation of the evictions in the region, failed to cause a ripple among op-

erators in the region. Such an investigation would receive no opposition whatsoever from the operators in the region. Men who refused to work were allowed to remain in the houses for weeks before they were put out.

In every instance, they were given an opportunity to accept their old jobs back and upon their refusal eviction warrants were issued and served at the expiration of the time limit prescribed. Observers in the region declare that the operators have more than played square in these proceedings. One operator, after informing his men that they might have an opportunity to go back to work, and the men refused, told them he would pay their moving expenses, up to \$20 a family, if they wanted to move to other plants.

The situation narrows down to this: Those workers who went out on strike on April 1 and refuse to return to work at the present wage scale must make way for the hundreds of workers who are coming into the region to go to work.

Transportation Still Dominates the Situation

WASHINGTON, Sept. 19.—Increased production of coal gives further confirmation to the fact that the problem now is one of transportation and not mining. This situation is generally recognized and it is restated in a communication from the Chamber of Commerce of the United States to industries of the country in seeking their co-operation for the purpose of stabilizing the coal situation. The letter follows the conference held last Friday between Government officials and business interests and the plan of the Chamber was put into operation to-day. At the same time, the Congress has passed the so-called anti-profiteering fuel bill.

The other piece of legislation regarding the coal situation provides for an investigation of the coal industry by a Federal coal commission and suggestions for the investigation have been made by Secretary of Labor Davis in a letter to Senator Shortridge of California.

Production of all coal, anthracite and bituminous,

in the week ended Sept. 16, is estimated by the Geological Survey at 10,200,000 to 10,500,000 tons. The output of bituminous coal is not expected to exceed 9,500,000 tons. The rate of production has not been under this figure during the three weeks period following the general resumption of mining under the Cleveland agreement. Loadings on Monday, Sept. 11, were 35,808 cars, a larger number than reported for any day since March. However, there was a drop on the following days and on Thursday, the latest day of which there is a report, loadings totaled 26,923 cars.

"Transportation is the dominant and limiting factor in soft coal supply," the Geological Survey says. "Restricted by transportation difficulties the rate of soft coal production is seemingly fixed temporarily at 1,600,000 tons a day, or 9,600,000 tons a week—this in spite of a strong market and prices sustained at high levels not only by demand for current consumption but also by the need for rebuilding ordinary reserves and by extraordinary call for household sizes.

CAR ORDERS MODIFIED

Interstate Commerce Commission Grants Greater Freedom in Moving Certain Commodities

WASHINGTON, Sept. 19.—Greater freedom in the movement of iron and steel, lumber and other products generally will be allowed as the result of car service order No. 25 issued this afternoon by the Interstate Commerce Commission to become effective midnight, Sept. 21. The order increases the number of commodities to which the railroads are to give preference movement, provided they can move all traffic as ordered, and at the same time abolishes the priorities created for the benefit of preferred users of coal, except when such preferences may be ordered by the Commission itself.

This will result in greater movement of coal also to iron and steel and lumber plants which have not been on the preferred list. The order of the Commission reduces the number of its service agents to four, three of whom are in the Washington office, and one left in the field to take care of Lake cargo traffic at Cleveland. This order supersedes order No. 23, which is to be suspended at midnight, Sept. 20.

Commodities added to the list of those given pre-

ferred movement are mine supplies, medicines, fertilizers, seeds, newsprint paper and petroleum and its products.

The new orders allow the use of open top cars for loading with other commodities while they are on their way back to the mines, and among other things this will be helpful for the movement of iron ore. This is made contingent upon the fact that loading is to points not beyond the mines, and such loading will not delay or minimize the production and transportation of coal. By this order use of cars will be allowed for hauling road and building material and fluxing stone for furnaces.

The Commission simultaneously issued an order changing order 24 so as to conform to order 25 in the list of commodities to be given preferred movement. This has no effect on order 22 relating to routing of traffic so as to avoid congestion. The changes made accord with recommendations made at the Hoover coal conference last Friday.

Addition to the list of commodities given preferred movement was made necessary by the fact that the railroads in the issuance of embargoes included in the prohibited lists commodities which the Commission considered to be essential and permitted commodities to move which were not so considered.

Iron and Steel Markets

LARGE RAIL ORDERS

Heavy Tonnages Likely to Be Closed Before Oct. 1

Steel Output Increases and the Volume of Business at Premium Prices Is Less

Further increases in output of pig iron and steel are reported from all producing centers, and at the same time there is a falling off in the volume of new business done at premium prices. Both movements represent progress out of the scarcity market conditions created by the double strike.

Eight additional blast furnaces, chiefly in Ohio and Western Pennsylvania districts, have been blown in. As a whole the steel industry is probably running at a 65 per cent rate, and there is the unusual condition of several large independent companies exceeding the rate of the Steel Corporation. Connellsville coke output gains but slowly, and most of the blast furnaces just started are getting their coke elsewhere.

Of first importance in the week's developments was the decision of the Steel Corporation to advance its rail price to \$43 on Oct. 1, and meanwhile to book orders for the first half of 1923 at \$40. At least one large independent company has announced a like policy.

It already appears that a large tonnage of rails will be booked for next year by Oct. 1. At Chicago orders for 100,000 tons have been placed already, and a total of 300,000 is expected by the end of the month. In the East an initial inquiry of 125,000 tons for the New York Central has appeared, and options are asked on 25,000 tons more up to March 1 and 50,000 tons up to June 1. Other tentative tonnages are 25,000 for the Norfolk & Western, 13,000 for the Reading and 8000 for the Long Island. If the Pennsylvania inquiry equals the 200,000 tons distributed for 1922 and the B. & O. and other lines come forward in the way that now seems likely, the rail mills will have much better backlogs for the winter than were in sight last autumn.

Buyers of steel regard the efforts of the mills to insure winter rail rollings an index to the expected easing of conditions in the heavier products later in the year. It is recognized, however, that heavier coal deliveries mean also shortages of cars for certain finished products.

For the 1000-mile joint pipe line of the Standard and Sinclair companies the National Tube Co. will furnish 100,000 tons of 8, 10 and 12-in. pipe.

An order of the Commerce Commission effective Sept. 21 abolishing certain priorities on coal will result in a larger coal movement to iron and steel plants. More freedom is granted also in the use of open-top cars. However, the transportation situation at Pittsburgh is not good and no marked improvement is in prospect. With car shortages limiting production, coke has gone to \$11.50, an advance of 50 cents in the week and of \$1.50 in two weeks.

New locomotive orders total 189 and fresh in-

quiries 68, not including 100 expected shortly from the Santa Fe and 50 each from the Burlington and Rock Island. Special efforts are being made to expedite deliveries on locomotive steel.

At Chicago track spikes and bolts are \$2 a ton higher, and light rails \$3, in line with the new price for standard sections.

September fabricated steel contracts are below the rate of any of the last six months, but at 55 per cent of capacity are fully up to the average of the last decade. A further falling off is indicated as fresh projects are fewer. In reinforcing bars a water project at Tulsa, Okla., will mean a large tonnage, probably 7500 tons.

Cast iron pipe has been advanced to a \$40 base, Birmingham, for 6-in. pipe and larger and business is still moving in fair volume.

Advances in steel castings, ranging from 15 to 20 per cent, are looked for, effective Oct. 1.

The price of Southern pig iron again has been advanced \$2, and \$27, Birmingham, is now the usual quotation, but owing to freight congestion, very little Southern iron is being delivered. The sale of 20,000 tons of basic at \$34, Valley, apparently represents an advance of \$1.50, although the transaction is understood to have some special features. Owing to reduced freight rates on pig iron from Florence and Sheffield, Ala., by barge and rail, Southern iron promises to be a more important factor in St. Louis and Chicago. Foundry iron prices show little change, and in some centers conditions are easier, but delays in deliveries are frequent. At 161,000 tons on Sept. 1 merchant pig iron stocks of regularly reporting furnaces were the lowest in many months.

Low phosphorus iron is now figuring in import sales. One lot of 5000 tons has been closed for an eastern Pennsylvania foundry and considerably more is under negotiation.

Pittsburgh

Number of Sellers Increases, But Price Trend Is Still Upward

PITTSBURGH, Sept. 19.—Increased production of pig iron by the steel companies has begun to show in a moderate way in the production of steel, and in a few lines, notably in steel bars, there are more sellers than there were recently. Prices, however, are no softer; on the contrary, the trend is still in the other direction and must necessarily hold to this tendency so long as the demand exceeds the supply, as is still the case. The Steel Corporation in this district does not seem to be able for one reason or another to greatly increase output or reduce its obligations and of course cannot take on much, if any, business for early delivery. The bulk of the demand is for early shipments and the position of the Steel Corporation naturally throws most of the orders to the independents. The latter are not taking long time obligations with serious transportation difficulties believed to be immediately ahead, and moreover, selling for brief periods will enable them to apply promptly any increases in costs to selling prices.

Partial settlement of the strike of the railroad shopmen has not had much effect yet upon the operation of

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Sept. 19, 1922	Sept. 12, 1922	Aug. 22, 1922	Sept. 20, 1921
No. 2X, Philadelphia...	\$34.26	\$34.64	\$33.14	\$21.34
No. 2, Valley furnace...	\$36.50	35.00	33.00	21.00
No. 2, Southern, Cin'ti...	29.05	29.05	24.05	23.50
No. 2, Birmingham, Ala...	25.00	25.00	20.00	19.00
No. 2 foundry, Chicago...	32.00	32.00	30.00	22.00
Basic, del'd, eastern Pa...	31.00	32.00	28.64	19.25
Basic, Valley furnace...	34.00	32.50	26.00	19.25
Valley Bess., del. Pitts...	35.77	34.77	31.76	21.96
Malleable, Chicago...	32.00	32.00	30.00	22.00
Malleable, Valley...	34.00	33.00	31.50	20.00
Gray forge, Pittsburgh...	37.77	36.77	34.76	21.96
L. S. charcoal, Chicago...	36.15	36.15	34.65	33.50
Ferromanganese, seaboard	67.50	67.50	67.50	60.00

Rails, Billets, etc., Per Gross Ton:

O-h. rails, heavy, at mill	\$40.00	\$40.00	\$40.00	\$47.00
Bess. billets, Pittsburgh...	40.00	40.00	37.50	29.00
O-h. billets, Pittsburgh...	40.00	40.00	37.50	29.00
O-h. sheet bars, P'gh...	40.00	40.00	37.50	30.00
Forging billets, base, P'gh	45.00	45.00	43.00	34.00
O-h. billets, Phila...	45.17	45.17	42.67	35.74
Wire rods, Pittsburgh...	47.50	47.50	45.00	41.00
Skelp, gr. steel, P'gh, lb.	2.00	2.00	2.00	1.65
Light rails at mill	2.25	2.00	1.90	1.75

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	2.575	2.575	2.325	1.95
Iron bars, Chicago...	2.25	2.25	2.15	1.75
Steel bars, Pittsburgh...	2.00	2.00	2.00	1.60
Steel bars, Chicago...	2.10	2.10	2.35	1.75
Steel bars, New York...	2.34	2.34	2.34	1.98
Tank plates, Pittsburgh...	2.25	2.00	2.00	1.60
Tank plates, Chicago...	2.30	2.30	2.20	1.75
Tank plates, New York...	2.49	2.34	2.34	1.98
Beams, Pittsburgh...	2.00	2.00	2.00	1.60
Beams, Chicago...	2.20	2.20	2.35	1.80
Beams, New York...	2.34	2.34	2.34	1.98
Steel hoops, Pittsburgh...	2.75	2.75	2.75	2.15

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Sheets, Nails and Wire,	Sept. 19, 1922	Sept. 12, 1922	Aug. 22, 1922	Sept. 20, 1921
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh	3.35	3.35	3.35	2.75
Sheets, galv., No. 28, P'gh	4.35	4.35	4.35	3.75
Sheets, blue an'd, 9 & 10	2.50	2.50	2.50	2.20
Wire nails, Pittsburgh...	2.60	2.60	2.60	2.90
Plain wire, Pittsburgh...	2.35	2.35	2.35	2.60
Barbed wire, galv., P'gh.	3.15	3.15	3.15	3.55
Tin plate, 100-lb. box, P'gh	\$4.75	\$4.75	\$4.75	\$5.25

Old Materials, Per Gross Ton:

Carwheels, Chicago	\$24.50	\$23.50	\$21.00	\$14.50
Carwheels, Philadelphia	23.00	21.00	19.00	17.00
Heavy steel scrap, P'gh	21.00	19.50	18.25	14.00
Heavy steel scrap, Phila	18.00	16.00	15.50	11.50
Heavy steel scrap, Ch'go	18.00	18.50	16.00	11.50
No. 1 cast, Pittsburgh...	24.00	21.50	19.00	17.00
No. 1 cast, Philadelphia...	23.00	21.00	19.00	17.00
No. 1 cast, Ch'go (net ton)	21.00	22.00	19.50	13.25
No. 1 RR. wrot., Phila...	22.00	21.00	18.50	15.00
No. 1 RR. wrot. Ch'go (net)	17.50	18.00	15.25	11.50

Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt...	\$11.50	\$11.00	\$12.00	\$3.25
Foundry coke, prompt...	12.50	12.50	13.00	4.25

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	14.12½	14.12½	14.12½	12.25
Electrolytic copper, refinery	13.75	13.75	13.75	12.12½
Zinc, St. Louis...	6.65	6.37½	6.22	4.17½
Zinc, New York...	7.00	6.72½	6.57½	4.67½
Lead, St. Louis...	5.90	5.60	5.60	4.45
Lead, New York...	6.25	5.95	5.90	4.65
Tin (Straits), New York...	32.12½	32.12½	32.50	26.50
Antimony (Asiatic), N. Y.	6.75	6.25	5.25	4.45

Composite Price, Sept. 19, 1922, Finished Steel, 2.419c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets	Sept. 12, 1922, 2.412c. Aug. 22, 1922, 2.412c. Sept. 20, 1921, 2.200c. 10-year pre-war average, 1.689c.
These products constitute 88 per cent of the United States output of finished steel	

Composite Price, Sept. 19, 1922, Pig Iron, \$32.54 Per Gross Ton

Based on average basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham	Sept. 12, 1922, \$31.52 Aug. 22, 1922, 26.86 Sept. 20, 1921, 20.01 10-year pre-war average, 15.73
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those roads in this part of the country which were most seriously affected. The trouble, primarily, has been due to the crippled condition of motive power and now that so many cars have been loaded with coal there is a shortage of cars for the movement of steel. The Carnegie Steel Co. has suffered especially from car shortages lately, and is likely to inaugurate before long river deliveries at least in and around the Pittsburgh district. If the transportation conditions get as bad as they are expected to, it is probable that all of the steel makers here in a position to do so will use the river for getting material away from the mills.

Suspension by the Ford Motor Co. last Saturday was a surprise to a good many of the steel trade who had looked upon the announcement with some skepticism. It is now stated that the step was necessary to avoid being regarded as a bluff, and that there will be a resumption by the Ford company at an early date. It is said that the Ford company did not suspend because of lack of orders and that consequently it is not likely to remain down long. The real effect of this suspension has not yet been fully felt, because there were a good many modifications of the original orders suspending

shipment of materials. This, however, will be felt later on when the Ford company does resume, as it is reliably reported that as a result of the late shipments the company has fully a month's stock of material on hand.

A further advance of \$11 per ton has been announced since a week ago in wrought iron pipe, making a total of \$21 per ton in about a month. A further advance in steel pipe appears to be likely since it is claimed that the higher wages more than offset the increase announced by independents Aug. 15 and followed by the National Tube Co. Aug. 23. A feature of the tubular goods market has been an order for a 1000-mile pipe line by the Standard Oil Co. of Indiana and Sinclair Oil Co. jointly. The National Tube Co. will furnish more than 100,000 tons of 8, 10 and 12-in. pipe for this line.

Announcement of the increase in the price of rails, effective Oct. 1, has not yet been productive of many orders to the local maker, although it is stated that railroads ordinarily served from Pittsburgh are figuring on their requirements and will get the orders in before the new prices are in effect.

Most grades of pig iron have advanced since a week

ago, basic going to \$34 on a sale of 20,000 tons by a Youngstown steel maker. Largely as a result of the activities of dealers, there has been a further sharp advance in scrap prices. With car shortages limiting production, coke prices have gone up further.

Pig Iron.—Those who must have pig iron for early delivery find they must meet sellers' price ideas. A Youngstown steel maker recently sold 20,000 tons of basic iron at \$34, furnace, and while there has been some disposition to question the sale, some claiming that some sort of a trade was involved and that consequently the transaction could not be regarded as setting the market at that figure, it is a fact that on two or three good sized inquiries which lately have been out, the quotations have been above \$34. Moreover, it is believed that two companies now seeking round tonnages would pay \$34 to secure them. The market, therefore, cannot be well quoted below this price. Bessemer iron has advanced \$1 per ton, to \$34, Valley furnace, on a number of small sales, but the largest sale of this grade in this district lately was one of 1000 tons, the iron being sold by a western Pennsylvania steel maker at \$33.50, furnace, the freight rate to Pittsburgh being the same as from the Valley, or \$1.77. We note a sale of 1500 tons of foundry iron to a local sanitary ware manufacturer on a basis of \$36, Cleveland, for the base grade. This means \$38.55, delivered Pittsburgh, and figures \$36.88, Valley furnace. There is no foundry iron available at present from any of the Valley furnaces, but it is possible that the A. M. Byers Co., which will light up its Mattie furnace at Girard, Ohio, late this week, will have some tonnage for market, and there is also a possibility that some of the steel companies may make some foundry iron. There is no Valley basis on foundry iron, but based on prices in other markets, it is probable that the price would be \$36.50 to \$37 for shipment to Pittsburgh.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.76 per gross ton:

Basic	\$34.00
Bessemer	34.00
Gray forge	36.00
No. 2 foundry	\$36.50 to 37.00
No. 3 foundry	36.00
Malleable	34.00

Ferroalloys.—With indications of an early passage of the tariff bill, imposing a duty of \$33.60 per ton on 80 per cent imported ferromanganese, there is little disposition on the part of domestic producers or dealers who have stocks of foreign material in this country to consider selling and prices either on the domestic or foreign material for spot shipment are nominal. British material still is priced at \$67.50 c.i.f. Atlantic seaboard for 80 per cent for future shipment, but whether it will stay at that price after the tariff goes into effect depends on the prices named on domestic material. Collection of the new duty is going to be more bothersome than former ones, since it provides for 1½c. per lb. contained manganese and this entails close analysis of every shipment. The Jones & Laughlin Steel Co. has started making its own ferromanganese and is understood to have a supply of ore sufficient to run it more than two years. Spiegeleisen is about \$1 a ton lower. The asking prices still are \$38, furnace, for average 20 per cent material and \$37 for 16 to 19 per cent, but sales of the former grade have been made at \$37. There has been no change in 50 per cent ferrosilicon, but ferrotungsten already has been marked up to 60c. per lb. contained in anticipation of the passage of the tariff.

We quote 78 to 82 per cent ferromanganese, \$75 c.i.f. Atlantic seaboard for domestic; British, spot, \$70 to \$72.50; British, future, \$67.50; German, 76 to 80 per cent, \$67.50 to \$70. Average 20 per cent spiegeleisen, \$37 to \$38 furnace; 16 to 19 per cent, \$36 to \$37 furnace; 50 per cent ferrosilicon, domestic, \$55 to \$60 furnace, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, \$50.50; 11 per cent, \$53.80; 12 per cent, \$57.10; 13 per cent, \$61.10; 14 per cent, \$64.10; silvery iron, 6 per cent, \$39; 7 per cent, \$40; 8 per cent, \$41.50; 9 per cent, \$43.50; 10 per cent, \$45.50; 11 per cent, \$48.80; 12 per cent, \$52.10. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$3.66 per gross ton.

Steel Skelp.—As high as 2.50c. still is obtainable on all tonnages of narrow grooved skelp for early de-

livery, but the prevailing market is about 2.25c. and large users, buying on contract, are beginning to find accommodation from independent makers at 2c. for their requirements of both grooved and sheared material.

Wire Products.—While a fair amount of business is passing in nails at \$2.75 base per keg, Pittsburgh, the failure of the leading interest to follow the advance recently set up by independent manufacturers appears to be exerting conservatism among buyers with regard to their general requirements. This condition, however, does not disturb the strength of the market because a shortage of wire drawers is felt in all products and a shortage of box cars impedes deliveries. Prices are given on page 755.

Iron and Steel Pipe.—Leading makers of wrought iron pipe have issued new cards, dated Sept. 12, further increasing prices of standard pipe \$11 per ton, by a reduction in the discount of 5½ points. This makes a total advance in wrought iron pipe in about a month of \$21 per ton and the new discounts of the largest producer now are only slightly below those quoted by this interest throughout the greater part of 1920. Some business pending at the former discount was driven in by the advance, but trading at the new prices is very limited. Prices of steel pipe are firm at the advance of about a month ago. One independent producer is said to be contemplating a further advance of \$6 per ton next week. A feature of the week in steam pipe has been the placing of a 1000-mile line to tap the Wyoming field by the Standard Oil Co. and Sinclair Oil Co., jointly. This order was placed with National Tube Co. and will aggregate about 100,000 tons. It is the largest individual order on record. There is no appreciable let up in the demand for merchant pipe, least of all in the butt weld sizes. Discounts are given on page 755.

Boiler Tubes.—Withdrawal of quotations by some makers of charcoal iron boiler tubes is taken to mean a further advance in prices in line with the advance recently announced in wrought iron pipe. Iron tubes are not selling with much freedom in competition with steel tubes. There is good demand for the latter. Discounts are given on page 755.

Wire Rods.—The market does not grow any easier, because available supplies consist of the small tonnages resulting from the inability of wire manufacturers to secure a sufficient number of wire drawers. For early delivery the market still is quotable at \$47.50, base, for common soft rods, this having been the basis of the most recent business. Steel production is gaining, however, and makers may soon name prices on fourth quarter contracts. The common expectation is that the price will be around \$45. The leading interest has made no public announcement of any change from \$43 for the base size of soft rods.

We quote No. 5 common basic or Bessemer rods to domestic consumers, \$47.50; chain rods, \$47.50; screw stock rods, \$52.50; rivet and bolt rods and other rods of that character, \$47.50; high carbon rods, \$54.50 to \$57.50, depending on carbon, per gross ton, f.o.b. Pittsburgh or Youngstown.

Billets, Sheet Bars and Slabs.—The supply situation is growing slightly easier with independent producers, notably on Bessemer steel, due to the more abundant supply of coal and the increase in pig iron production. It is comparatively easy to secure Bessemer billets and sheet bars at \$40, Pittsburgh, but there is still some difficulty in obtaining supplies of open-hearth material, for up to this time open-hearth operations have not risen as rapidly as have those of the blast furnaces, because few manufacturers had any stocks of cold pig iron when the fuel situation eased up. A change for the better with respect to open-hearth steel supplies is expected shortly, however, and while fourth quarter prices are not yet being announced, it is believed they will not be above \$40 on sheet bars, billets or slabs. For early delivery \$42 is being asked by some makers on open-hearth sheet bars.

We quote 4 x 4-in. soft Bessemer and open-hearth billets, \$40; 2 x 2-in. billets, \$40 to \$42; Bessemer sheet bars, \$40; open-hearth sheet bars, \$40 to \$42; slabs, \$40; forging billets, ordinary carbons, \$45 to \$47, all f.o.b. Pittsburgh or Youngstown mills.

Sheets.—The market still exhibits considerable firmness, more in galvanized and full finished stock than in ordinary black sheets, but this condition is due to a large extent to costs, rather than to the urgency of the demand. The leading interest because of its inability to secure sufficient supplies of steel has relatively heavier obligations than the independents. The latter have been operating at a pretty high rate over the past month or six weeks, and running at the recent rate their net obligations are equal to slightly less than 1½ months' production. It is a question whether this showing is not due to an unwillingness of buyers to commit themselves as much as the unwillingness of makers to sell. The American Sheet & Tin Plate Co. last week operated 71 per cent of its mills, but probably will not do that well this week, because transportation conditions are interfering with steel supplies. Independent companies are averaging well above 80 per cent operations. Prices are given on page 755.

Tin Plate.—The situation is without special change. This is the quiet season of the year and with supplies ample for all requirements, increased costs as yet are without effect upon selling prices.

Cold-Finished Steel Bars and Shafting.—The market is fairly steady in spite of the loss of the Ford tonnage for the time being and a slightly easier supply situation with respect to hot-rolled bars. Some of the independent makers of the latter lately have resumed rolling and shipping. Corporation deliveries, however, still are limited and if there were a really active demand for cold-finished bars the market would be stronger. All makers are quoting 2.50c. base Pittsburgh for carloads, but there are some deviations from this base. Ground shafting is unchanged at 2.90c. base, f.o.b. mill, for carload.

Hot-Rolled Flats.—The market is firm at 2.75c. base, Pittsburgh minimum, on the ordinary widths and gages, but for prompt delivery premiums of \$2 to \$3 are fairly common and on narrow light stock some makers are unwilling to consider less than 3c. base. Suspension of the Ford Motor Co. has not yet been seriously felt by makers of strips.

Cold-Rolled Strips.—Most makers still are open to business at 4.25c., base, Pittsburgh, but there are instances where premiums for prompt delivery of as much as \$5 per ton have been paid.

Iron and Steel Bars.—Some of the independents are slightly freer sellers than they were recently and generally are quoting 2c. base, Pittsburgh, on desirable tonnages for delivery in four to six weeks. As much as 2.25c. still is asked by some for small tonnages, but the real market appears to be crystallizing around 2c. The Carnegie Steel Co. still is having trouble in catching up with its obligations, and is largely out of the market. Iron bars are firmer at 2.50c. base, for refined iron in carload lots.

We quote steel bars rolled from billets at 2c. to 2.25c.; reinforcing bars, rolled from billets, 2c. to 2.25c. base; rail steel reinforcing bars, 1.90c. to 2c.; refined iron bars, 2.50c. in carloads, f.o.b. mill, Pittsburgh.

Nuts and Bolts.—Demand is reported to be brisk and with supplies of steel still difficult to obtain, prices are firmly maintained. Discounts are given on page 755.

Rivets.—The market holds firm since there is a demand that is hard to meet because of the scarcity of railroad material. Prices and discounts are given on page 755.

Track Fasteners.—Good demand is noted for small spikes and as makers are heavily committed and find it hard to get sufficient supplies of steel, they are inclined to seek higher prices. The minimum now is 3.25c. base, Pittsburgh, and some are asking 3.50c. Large spikes also are firm, with 2.75c. the minimum and some makers quoting 2.85c. Demand is moderate, but few makers are anxious for additional business. It is expected that angle bars will advance with standard rails on Oct. 1. Prices are given on page 755.

Structural Material.—The market still shows considerable firmness, although the approach of the end of the active building operations is reflected in fewer

structural awards and fewer new inquiries. The market has not lately been much above 2c. on sizable inquiries, but on small tonnages for quick delivery is quotable up to 2.25c. Prices are given on page 755.

Plates.—Specific tonnages are not especially numerous, but there are some orders from tank and boiler makers for stock. Independents seem to be getting the bulk of the business because of the heavily committed condition of the steel corporation and the independent price on plates is 2.25c., Pittsburgh. Lately that price has not been exceeded much or frequently. Prices are given on page 755.

Steel Rails.—It is expected that independent rail makers will meet the advance recently announced by the Steel Corporation of \$3 per ton on standard rails, effective Oct. 1. While not many orders have been placed with local makers, it is expected the railroads tributary to Pittsburgh will get in their specifications in time to escape the increase. Light rails rolled from new steel are quoted by all makers at 2.25c., base.

We quote 25 to 45-lb. sections, rolled from new steel, 2.25c. base; rolled from old rails, 2c. base; standard rails, \$40 per gross ton mill for Bessemer and open-hearth sections.

Coke and Coal.—While it is reported that there has been some weakening among the strikers in the Connellsville district, and in a number of places the men are seeking work, production has not increased because the limited supply of cars will not permit the putting on of additional men. The demand for furnace coke exceeds the offering and as high as \$12 per net ton at ovens lately has been done. On the basis of recent sales, the market is quotable at \$11.50 to \$12, but the indications are that \$12 soon will be minimum. Foundry coke is quotable from \$12.50 to \$13.50, but is not plentiful. The coal market has softened lately due to a lighter demand, and steam coal of fairly good quality lately has been offered as low as \$4 per net ton at mines, for mine run grade. Good quality steam coal, however, commands \$4.50, while by-product grade is at \$5 and gas coal at \$5.50 to \$6.50.

Old Material.—Further sharp advances have been established since a week ago, partly as a result of purchases by melters, but chiefly because of high prices offered by dealers with contracts with mills in the Youngstown district. Dealers are offering as high as \$22.50 for heavy melting steel at Youngstown, and while this is about \$1 per ton higher than has been paid by any of the Pittsburgh district plants, \$21.50, Midland, Pa., having been done, and fully \$2 more than some mills here are offering, it is hard to see how further advances can be prevented here with prices where they are in Youngstown and available supplies still very limited. Dealers still are counting on purchases by Pittsburgh mills at an early date, and their firm position on prices also is ascribable to the wide disparity between scrap and pig iron prices. Evidently little consideration is being given to the fact that as pig iron production increases and steel works and rolling mills activities expand, the steel mills will be less dependent on outside scrap.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate as follows:

Per Gross Ton	
Heavy melting steel.....	\$21.00 to \$21.50
No. 1 cast, cupola size.....	24.00 to 25.00
Rails for rolling, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va.; Franklin and Williamsport, Pa.	22.00 to 22.50
Compressed sheet steel.....	19.00 to 19.50
Bundled sheet sides and ends.....	17.00 to 17.50
Railroad knuckles and couplers.....	23.00 to 23.50
Railroad coil and leaf springs.....	23.00 to 23.50
Low phosphorus standard bloom and billet ends.....	25.00 to 26.00
Low phosphorus plates and other grades.....	23.00 to 24.00
Railroad malleable.....	18.00 to 18.50
Iron car axles.....	28.00 to 30.00
Locomotive axles, steel.....	26.00 to 27.00
Steel car axles.....	21.50 to 22.00
Cast iron wheels.....	22.50 to 23.00
Rolled steel wheels.....	23.00 to 23.50
Machine shop turnings.....	15.00 to 15.50
Heavy steel axle turnings.....	17.50 to 18.00
Short shovelling turnings.....	16.50 to 17.00
Cast iron borings.....	17.00 to 17.50
Heavy breakable cast.....	19.50 to 20.00
Stove plate.....	17.00 to 17.50
Sheet bar crop ends.....	24.00 to 25.00
No. 1 railroad wrought.....	17.00 to 17.50

Chicago

Heavy Contracting for Rails—Buying by the Carriers Still Active

CHICAGO, Sept. 19.—The advance to \$43 on rails effective Oct. 1 has caused railroads to contract for their needs to get the benefit of the present price. Fully 100,000 tons has thus far been placed and the total may reach 300,000 tons before the month closes. Other advances include \$1 a ton on plates, shapes and bars for indefinite delivery, \$2 a ton on track spikes and bolts and \$3 on light rails. Bookings of a leading mill are somewhat heavier than in recent weeks because of rail orders. On the other hand, the feverish demand for steel for prompt shipment, which was at its height a week or two ago, has abated with the improvement in mill operations. Plates, shapes and bars for three to six weeks' delivery are now available at 2c., Pittsburgh, or 2.34c., Chicago.

Railroad buying continues to be the feature of the market. The carriers are not only buying rails and fastenings but they are placing liberal orders for plates, shapes and bars for car repair work and are letting numerous contracts for bridges. It is notable that while buildings are less numerous among fabricating projects railroad bridge work is accounting for an increasing amount of tonnage. Four railroad bridge awards this week aggregate over 4000 tons. Railroad car building has fallen off very materially, but locomotive purchases are heavy. Car shortage is interfering with shipments of both iron and steel. Present regulations restrict the furnaces and mills to the use of gondola cars with sides under 42 in. in height and do not even permit them to load other equipment in the direction of the coal mines. This difficulty is forcing some mills to revise their rolling schedules to include only such material for which adequate storage space is available.

Production has registered another gain, the Illinois Steel Co. having added one blast furnace each at Gary and South Chicago, giving it a total of 14 active stacks. At the same time, it has increased its steel output to 65 per cent of ingot capacity. The Inland Steel Co. continues on a 65 per cent basis with no prospect of immediate improvement. Merchant blast furnace operations remain unchanged.

Ferroalloys.—An inquiry for 400 tons of spiegeleisen is current. The imminent passage of the tariff bill foreshadows a material advance in ferromanganese. It is probable that some foreign shipments now on the sea will arrive too late to escape the imposition of the duty.

We quote 78 to 82 per cent ferromanganese, future, \$75.06; prompt, \$82.56, delivered; 50 per cent ferrosilicon, \$55 delivered on contract and \$65 prompt delivery; spiegel-eisen, 18 to 22 per cent, \$50, delivered.

Pig Iron.—Merchant furnace operations are unchanged and improvement is delayed by slow deliveries of low volatile coal required for coking. Just how soon the fuel situation will permit the blowing in of additional furnaces cannot be foreseen at this time, but it is hoped that such action will be possible by Oct. 1. Two Iroquois stacks are scheduled to go in before the remaining idle capacity in the district. Demand for prompt iron is active and a considerable number of contracts for fourth quarter have been closed. Current inquiries include 600 tons of foundry for local delivery during fourth quarter, 300 tons of foundry for October and November shipment wanted by a northern Indiana melter and 100 tons of malleable for prompt delivery. A Michigan buyer has closed for 500 tons of malleable for fourth quarter and is still in the market for an equal tonnage. Prices on Northern iron remain unchanged, but Southern foundry has advanced to a minimum of \$27 base Birmingham. Shipments from the South show slight improvement, although still very uncertain. Southern iron shipped by barge and rail will again be a factor in this market as the result of failure of the Interstate Commerce Commission to suspend a river and rail rate of \$4.18 from Florence and Sheffield, Ala., to Chicago. The company which could take

advantage of this rate, however, is not now in the market. Charcoal iron remains unchanged in price and two sales of 250 tons each for fourth quarter shipment are reported. Inquiry for charcoal is active.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge of 61c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago.....	\$36.15
Northern coke, No. 1, sil. 2.25 to 2.75.....	33.00
Northern coke, foundry, No. 2, sil. 1.75 to 2.25.....	32.00
Northern high phos.....	32.00
Southern No. 2.....	33.00
Malleable, not over 2.25 sil.....	32.00
Basic.....	32.00
Low phos., Valley furnace, sil. 1 to 2 per cent copper free.....	38.00
Silvery, sil. 8 per cent.....	46.29

Plates.—Material for indefinite delivery has advanced to a minimum of 2.10c., Chicago, while the best quotation for specific shipment remains 2.30c., Chicago. Demand is still in good volume, although not so pressing as a week or two ago. An Eastern mill is soliciting business in this territory for three to six weeks' delivery at 2c., Pittsburgh, or 2.34c., delivered Chicago. This price appears to be the top of the market.

The mill quotation is 2.10c. to 2.34c., Chicago. Jobbers quote 2.90c. for plates out of stock.

Cast-Iron Pipe.—Prices have advanced to a minimum of \$40 base, Birmingham, for 6-in. and larger, and considerable business is moving at higher figures. The United States Cast-Iron Pipe & Foundry Co. has contracts for 1230 tons for Eloise, Mich.; 1750 tons for LaPorte, Ind.; 600 tons for Chicago and 188 tons for Milwaukee.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., \$52.20 to \$54.20; 6-in. and above, \$48.20 to \$50.20; class A and gas pipe, \$3 extra.

Bars.—The spread between the minimum and maximum prices on soft steel bars has contracted as a result of an advance of the former and a decline of the latter. The minimum quotation on material for indefinite delivery is now 2c., Chicago, while the best price for specific shipment is 2.10c., Chicago. Bars for three to six weeks' delivery are now being offered by an Eastern mill at 2c., Pittsburgh, or 2.34c., delivered Chicago. This price is now the top of the market. Demand is good, although not so urgent as a week or two ago. New business in bar iron is not equal to mill production, but specifications against contracts are in good volume. Prices are unchanged. Demand for hard steel bars is steady with prices the same and the mills comfortably booked.

Mill prices are: Mild steel bars, 2c. to 2.34c., Chicago; common bar iron, 2.25c. to 2.50c., Chicago; rail steel, 2c. to 2.10c., Chicago mill.

Jobbers quote 2.80c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.80c. for rounds and 4.30c. for flats, squares and hexagons.

Jobbers quote hard and medium deformed steel bars at 2.50c. base; hoops, 3.90c.; bands, 3.55c.

Rails and Track Supplies.—The advance in standard section rails for 1923 delivery effective Oct. 1, is causing many roads to place their orders to get the benefit of the \$40 price, thereby effecting a saving of \$3 a ton. Fully 100,000 tons has already been placed in Chicago and it is probable that the total will reach 300,000 tons before the end of the month. A considerable quantity of track supplies is being bought with the rails. Standard spikes have advanced to a minimum of 2.85c., mill, and bolts to a minimum of 3.85c., mill, while the plates have gone up to \$45 a ton. Light rails have advanced to 2.15c., mill. Inquiry for light rails is active, although orders are not yet heavy.

Standard Bessemer and open-hearth rails, \$40; light rails rolled from new steel, 2.15c., f.o.b. makers' mills.

Standard railroad spikes, 2.85c. to 3c., mill; track bolts with square nuts, 3.85c. to 4c., mill; tie plates, steel and iron, 2.25c., f.o.b. mill; angle bars, 2.40c., f.o.b. mill.

Jobbers quote standard spikes out of warehouse at 3.50c. base and track bolts 4.50c. base.

Wire Products.—Mill operations are commencing to show considerable improvement, but production is still far behind demand. Mills are experiencing difficulty in taking care of specifications and are accepting new or-

ders only when satisfied that they cover actual needs. No speculative business is wanted. Demand for nails is exceedingly active and business in barbed wire is good. There is an abnormal demand for small track spikes, used largely in coal mines. The leading producer has made no change in prices, while most independents are quoting \$3 a ton higher. For mill prices, see finished iron and steel, f.o.b. Pittsburgh, page 755.

We quote warehouse prices, f.o.b. Chicago: No. 9 and heavier black annealed wire and No. 9 and heavier bright basic wire, \$3.20 per 100 lb.; common wire nails, \$3.35 per 100 lb.; cement coated nails, \$2.75 per keg.

Bolts and Nuts.—Buyers are specifying heavily against contracts to get the benefit of the old discounts. Contracts for fourth quarter are being closed at the new prices in considerable number. Ruling discounts are those on page 755 except that the basing point is Chicago instead of Pittsburgh.

Jobbers quote structural rivets, 3.50c.; boiler rivets, 3.60c.; machine bolts up to $\frac{3}{8}$ x 4 in., 50 per cent off; larger sizes, 50 off; carriage bolts up to $\frac{3}{8}$ x 6 in., 45 off; larger sizes, 45 off; hot pressed nuts, squares and hexagons, tapped, \$2.75 off; blank nuts, \$2.75 off; coach or lag screws, gimlet points, square heads, 55 per cent off; quantity extras are unchanged.

Sheets.—Demand is less pressing than recently, but this is explained by the fact that much of the business which was pending has now been placed. The Inland Steel Co. has allocated practically all of its remaining 1922 output. Sales at premiums above the prices of local producers are growing less frequent.

Mill quotations are 3.35c. to 3.50c. for No. 28 black, 2.50c. to 2.60c. for No. 10 blue annealed and 4.35c. to 4.50c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 34c. per 100 lb.

Reinforcing Bars.—Inquiry is unusually active, particularly for small tonnages, ranging from 20 to 60 tons each. Some large jobs also are before the trade, an exceptionally large one being the Spavina water project, Tulsa, Okla., requiring 7500 tons. With an improvement in mill shipments in sight, sellers of concrete bars are taking more interest in new business. Additional inquiries include:

Power plant, Grand Tower, Ill.; 500 tons.
Prince Wells garage, Louisville, Ky.; 250 tons.
Kentucky highway department, bridges, 150 tons, bids to be in Sept. 30.

Oak Park Club, Oak Park, Ill.; 75 tons.

Awards include:

Pine Grove Apartments, Chicago, 265 tons, to Tucson Steel Co.

Foundations for Equitable Life Insurance Building, Des Moines, Ia. 125 tons, to Corrugated Bar Co.

Loyola University gymnasium, Chicago, 100 tons, to Concrete Steel Co.

Illinois Improvement Co., Sanitary District, Chicago, 125 tons, to Concrete Steel Co.

Pullman Co., foundry, Pullman, Ill., 100 tons, to Concrete Steel Co.

Public Service Co. of Northern Illinois, power plant, Waukegan, Ill., 100 tons, to Olney J. Dean.

Steel Castings.—Advances in prices ranging from 15 to 20 per cent, effective Oct. 1, will probably be announced next week.

Structural Material.—Probably two-thirds of the fabricators in this district are operating at capacity and have considerable work ahead with the result that they are not quoting on new work except for extended delivery. Other shops are rapidly getting into the same condition, fabricating awards are still numerous, but there is less new work up for bids. There is no doubt that the advancing season and advancing labor and material costs are discouraging the bringing out of new projects. Demand for plain material is satisfactory, although not so insistent as recently. The minimum price on material for indefinite delivery has advanced to 2.10c., Chicago, while the best quotation for specific shipment is 2.20c., Chicago. An Eastern mill is quoting 2c., Pittsburgh, on three to six weeks' delivery, which is the equivalent of 2.34c., delivered Chicago.

The mill quotation on plain material is 2.10c. to 2.34c., Chicago. Jobbers quote 2.90c. for plain material out of warehouse.

Coke.—The local by-product producer is operating at less than 30 per cent of capacity, having been unable to increase production because of slow deliveries of low

volatile coal. It is hoped that the situation will improve by Oct. 1. Prices of local foundry coke remain unchanged. Southern by-product foundry continues to be sold here at the same price, \$15, Chicago, as that quoted by Chicago ovens. Sales of fully 25,000 tons were made in this district by one Southern producer during August. The Algona Steel Corporation, Saul Ste. Marie, Ont., has shut down all departments of its plant except one blast furnace because of fuel shortage.

Old Material.—Prices are in the balance, those on some grades being stronger while others have weakened. On the whole, the market has lost the momentum which carried prices up so rapidly in recent weeks and a reaction seems due, although whether it will be of short or long duration is not yet clear. Railroad offerings are no larger than heretofore, but large yard holdings both here and in the country have been placed on the market. Evidently the prospects for further advances are not regarded bright and the present price level is considered a satisfactory one at which to liquidate this material. Whereas this movement is relieving the general shortage of old material, the scarcity of cast scrap is disappearing as a result of weekly offerings of 1500 to 2000 tons from a local Government warehouse. Sensing the possibility of a turn in prices, consumers have largely withdrawn from the market and trading is between dealers. Railroad lists include the Santa Fe, 500 tons, and the Northern Pacific, 800 tons.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	\$25.00 to \$25.50
Cast iron car wheels	24.50 to 25.00
Relaying rails	27.50 to 32.50
Rolled or forged steel car wheels	22.50 to 23.00
Rails for rolling	19.50 to 20.00
Steel rails, less than 3 ft.	21.50 to 22.00
Heavy melting steel	18.00 to 18.50
Frogs, switches and guards cut apart	18.00 to 18.50
Shoveling steel	17.75 to 18.25
Drop forge flashings	12.50 to 13.00
Hydraulic compressed sheet	15.00 to 15.50

Per Net Ton	
Iron angles and splice bars	22.50 to 23.00
Steel angle bars	18.50 to 19.00
Iron arch bars and transoms	22.50 to 23.00
Iron car axles	25.50 to 26.00
Steel car axles	19.50 to 20.00
No. 1 busheling	15.00 to 15.50
No. 2 busheling	10.00 to 10.50
Cut forge	17.00 to 17.50
Pipes and flues	12.50 to 13.00
No. 1 railroad wrought	17.50 to 18.00
No. 2 railroad wrought	17.00 to 17.50
Steel knuckles and couplers	19.50 to 20.00
Coil springs	21.50 to 22.00
No. 1 machinery cast	21.00 to 21.50
No. 1 railroad cast	19.50 to 20.00
Low phos. punchings	17.00 to 17.50
Locomotive tires, smooth	17.50 to 18.00
Machine shop turnings	10.50 to 11.00
Cast borings	13.00 to 13.50
Stove plate	17.00 to 17.50
Grate bars	17.50 to 18.00
Brake shoes	17.50 to 18.00
Railroad malleable	22.00 to 22.50
Agricultural malleable	22.00 to 22.50

Reduced Rail Rate Asked for Imported Iron

WASHINGTON, Sept. 19.—Application was made to the Interstate Commerce Commission to-day by the Chesapeake & Ohio Railroad to establish low rates on short notice on imported pig iron from Newport News, Va., to Lynchburg and Richmond, Va. The application seeks to publish a rate of \$2.25 per gross ton to Lynchburg and \$1.50 to Richmond, with a minimum of 20 tons. The carrier explained the application on the ground that a ship is expected soon at Newport News with a cargo of pig iron which could not be distributed profitably by the importers because the domestic rates from the port are too high. The rate of \$2.25 to Lynchburg was proposed, it is stated, because that is the rate from Reusens, Va., 4 miles beyond Lynchburg, to Newport News for export or coastwise shipments. The rate from Reusens, it was pointed out, had been established by the Norfolk & Western, which was represented as having acquiesced in the proposal to establish the import rates named on short notice.

New York

Large Tonnages of Rails Under Negotiation — Serious Car Shortage

NEW YORK, Sept. 19.—Transportation problems continue to be very serious. The car shortage is pronounced and deliveries, particularly from the South, are extremely slow. In some cases, the delivery of pig iron has been delayed fully a month.

Pig Iron.—The week has been one of rather numerous transactions in domestic irons, but the volume of business has not been large. The largest purchase was by the American Locomotive Co., which took 1500 tons of foundry grades and 500 tons of charcoal for immediate delivery and is now in the market for 700 tons of charcoal. A stove manufacturer at Port Chester, N. Y., bought two 500-ton lots of foreign iron. Inquiries include one for 300 tons of No. 1 iron for last quarter delivery from a New England melter; 150 tons for the General Electric Co.; 200 tons for the American Car & Foundry Co., and 500 tons for a range manufacturer. Makers of Scotch iron are not able to sell for delivery earlier than November, but there is still some of this iron in the hands of brokers in this country. The price ranges from \$30 to \$32. On French, Belgian and other continental iron averaging from 2.50 to 3 per cent silicon prices range from \$26.50 to \$28 c.i.f. New York. On domestic irons, some sales are being made on a basis of \$32 for No. 2 plain and others on a basis of \$33.

We quote delivered in the New York district as follows, having added to furnace prices \$2.27 freight from eastern Pennsylvania, \$4.91 from Buffalo and \$5.44 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25..	\$36.27 to \$37.27
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	35.27 to 36.27
East. Pa. No. 2 fdy., sil. 1.75 to 2.25..	34.27 to 35.27
Buffalo, sil. 1.75 to 2.25.....	37.91 to 38.91
No. 2 Virginia, sil. 1.75 to 2.25.....	No sales

Ferroalloys.—Demand for ferromanganese is not so active as it has been during the last two months but moderate sales have been made. At least 2500 to 3000 tons of British alloy have been sold, part for October and part for November shipment. Quotations are unchanged at \$67.50, seaboard. There is also a moderate inquiry. There have also been sales of moderate quantities of spiegeleisen, both domestic and foreign, at \$38 to \$39, seaboard or furnace, for early delivery. Quotations for manganese ore are unchanged but nominal. A statement is made that British blast furnaces are running at full capacity on ferromanganese and that a scarcity of ore is feared due partly to the trouble in the near East. Practically all sellers of both domestic and imported 50 per cent ferrosilicon are on a \$65, delivered, basis. Moderate sales have been made at this level and specifications on contract are very good. Imported 14 to 16 per cent electric ferrosilicon is quoted at \$42, delivered. The market for ferrochromium is moderately active with the quotation for the 4 to 6 per cent carbon variety at 12c. per lb., delivered.

Ferromanganese, domestic, seaboard, per ton..	\$67.50
Ferromanganese, British, seaboard, per ton..	\$67.50
Spiegeleisen, 17 to 19 per cent, furnace.....	\$38.00
Spiegeleisen, 20 per cent, furnace.....	\$38.00 to \$39.00
Ferrosilicon, 50 per cent, delivered, per gross ton, carloads	\$57.50 to \$65.00
Ferrosilicon, 10 to 15 per cent, delivered, per gross ton	\$38.00 to \$40.00
Ferrotungsten, per lb. of contained metal, 40c. to 50c.	
Ferrochromium, 4 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr., delivered...12c. to 14c.	
Ferrovandium, per lb. of contained vanadium, \$3.50 to \$4.00	
Ferrocobaltitium, 15 to 18 per cent, in carloads, per net ton.....	\$200.00

Ores

Manganese ore, foreign, per unit, seaboard.	28.50c. to 29.50c.
Tungsten ore, per unit, in 60 per cent concentrates, nominal	\$3.50 up
Chrome ore, basis 48 per cent Cr ₂ O ₃ , crude, per ton, Atlantic seaboard.....	\$18.00 to \$18.50
Molybdenum ore, 85 per cent concentrates, per lb. of MoS ₂ , New York.....	45c. to 50c.

Cast-Iron Pipe.—The season of intense activity in purchasing of pipe is drawing to a close and few munici-

pal tenders are now noted. Makers are operating full time and find the shortage of raw materials much less acute. Deliveries are still extended and prices are strong. We quote per net ton, f.o.b. New York, in carload lots, as follows: 6-in. and larger, \$54.50; 4-in. and 5-in., \$59; 3-in., \$64.80, with \$4 additional for Class A and gas pipe.

Finished Iron and Steel.—The stiffening price situation of the last few weeks seems to be resulting in a large amount of orders against contracts. Buying for fresh enterprises is relatively dull as it was a week ago. The conspicuous development is negotiation by railroads for rail needs of the first half of 1923, to secure the \$40 per ton price before the advance to \$43 becomes effective on Oct. 1. Among rail inquiries are 200,000 tons for the New York Central (125,000 at the outset, 25,000 tons on a March 1 option and 50,000 tons on a June 1) option, 25,000 tons for the Norfolk & Western and 8000 tons for the Long Island. Price ranges on plates, bars and shapes are narrowing. The leading interests appear to be quoting 1.90c. and 2c. on the heavy tonnage products and probably only one independent company remains asking 2.50c., Pittsburgh, for plates. Prices generally range between 2c. and 2.25c. with large lots of bars obtainable for relatively early delivery at 2c. to 2.10c.; beams at 2c. to 2.15c. and plates 2.15c. to 2.25c. There is a feeling that the cost of the strike to the railroads may reduce the volume of their purchases for the remainder of the year and that the present lull in new inquiries results from a feeling that we are entering an area of inflation which is calculated to stop new enterprises. These two views are calculated to have opposite effects on the price situation and the present indications point to a more or less stationary level of prices forced by the definitely increased costs of steel manufacture.

We quote for mill shipments, New York delivery, as follows: For indefinite delivery, soft steel bars, structural shapes and steel plates, 2.24c. to 2.34c.; for delivery in a number of weeks, soft steel bars and plain structural material, 2.34c. to 2.59c.; steel plates, 2.49c. to 2.59c.; bar iron, 2.59c.

Warehouse Business.—Although prices are unchanged, warehouses in this district are again looking forward to a slight advance in quotations on bars, structural material and plates. The present warehouse quotations are based upon the Steel Corporation schedule, but the higher prices charged by the independent mills are believed to warrant a further advance. Sheet prices are said to be firm, but quotations cover a wide range, from 4.50c. and 5.50c. per lb., base on black and galvanized, the quotation of some warehouses on large lots from stock, to 4.90c. and 5.90c. per lb., base, the schedule being maintained by the leading independent and other iron and steel warehouses here. Selling of blue annealed sheets on a 3.93c. per lb. basis is reported. On wrought iron and steel pipe, warehouses, following an advance by the makers, have increased prices about \$12 per ton and report business good. There is no change in brass and copper warehouse quotations. We quote prices on page 778.

High Speed Steel.—While the market is quiet, prices continue firm at about 75c. per lb. for 18 per cent tungsten, the quotation of most producers, with special brands of some companies ranging up to 90c. per lb.

Coke.—The coke market is firmer than it was a few days ago. The quotations are slightly higher, furnace coke being quoted at \$11 to \$12, Connellsville ovens and foundry at \$14 to \$14.50, while by-product is still quoted at \$14 seaboard.

Old Material.—The market continues to move upward, heavy melting steel being quotable at \$13 to \$13.50 per ton this week compared with a price of \$11.50 to \$12 per ton last week. Dealers, as a rule, state that there is no evidence of weakening in the price situation. Railroad steel is stronger this week at \$13.75 to \$14.25 per ton and specification pipe is quoted at \$11.75 to \$12.25 per ton. Buying by mills is general and tonnages are fairly large. The Bethlehem Steel Co. and the Alan Wood Iron & Steel Co. are both pay-

ing \$17 per ton for heavy melting steel and it is stated that the Midland plant of the Pittsburgh Crucible Steel Co. is in the market for a heavy tonnage.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard.....	\$13.00 to \$13.50
Steel rails, short lengths, or equivalent	13.75 to 14.25
Re-rolling rails.....	13.75 to 14.25
Relaying rails, nominal.....	27.00 to 28.00
Steel car axles.....	17.00 to 18.00
Iron car axles.....	23.00 to 24.00
No. 1 railroad wrought.....	15.00 to 15.50
Wrought iron track.....	12.75 to 13.25
Forge fire.....	10.00 to 10.50
No. 1 yard wrought, long.....	13.00 to 13.50
Cast borings (clean).....	11.50 to 12.00
Machine-shop turnings.....	10.75 to 11.25
Mixed borings and turnings.....	10.75 to 11.25
Iron and steel pipe (1 in. diam., not under 2 ft. long).....	11.75 to 12.25
Stove plate.....	12.00 to 12.50
Locomotive grate bars.....	12.00 to 12.50
Malleable cast (railroad).....	13.00 to 13.50
Cast-iron car wheels.....	13.50 to 14.00

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast.....	\$19.50 to \$20.00
No. 1 heavy cast (columns, building materials, etc.), cupola size.....	17.00 to 17.50
No. 1 heavy cast, not cupola size.....	14.50 to 15.00
No. 2 cast (radiators, cast boilers, etc.).....	13.00 to 13.50

Boston

Largest Number of Orders for Foreign Iron Noted This Year Are Placed

BOSTON, Sept. 19.—The past week witnessed a larger number of individual orders placed in this territory for foreign iron than in any previous similar period this year. A few 500-ton lots were purchased, but nothing larger. From that amount, tonnages, ran down to carlots, aggregate bookings being estimated at 4000 to 5000 tons, largely fourth quarter delivery. No sales for first quarter, 1923, delivery are reported. Scotch iron continues the most, Continental the next and English the least active. No. 3 Scotch sold at \$30 to \$31 c.i.f. dock Philadelphia and \$32 dock here, Belgian high phosphorus at \$26 and phosphorus and manganese 0.60 to 0.80 at \$26.50 c.i.f. dock, while French fetched slightly better prices. English iron sold at \$27 to \$29 on cars, dock. About 2000 tons of domestic iron, Alabama at \$28 furnace base and Virginia at \$32 furnace base, and 200 tons of malleable, the market for which is \$34 furnace, are included in the week's transactions. Sellers of foreign iron report greater difficulty in securing cars in which to make local shipments. Most cars available are in poor order and are loaded far below capacity. Instances are cited where as little as eight tons have been loaded.

We quote delivered prices, on the basis of the latest reported sales, now infrequent, and as follows, having added to furnace prices \$3.65 freight from eastern Pennsylvania, \$4.91 from Buffalo, \$5.92 from Virginia and \$9.60 from Alabama:

East. Penn., sil. 2.25 to 2.75.....	\$36.15 to \$38.15
East. Penn., sil. 1.75 to 2.25.....	35.65 to 37.65
Buffalo, sil. 2.25 to 2.75.....	39.41 to 41.41
Buffalo, sil. 1.75 to 2.25.....	38.91 to 40.91
Alabama, sil. 2.25 to 2.75.....	38.10
Alabama, sil. 1.75 to 2.25.....	37.60
Virginia, sil. 2.25 to 2.75.....	38.92
Virginia, sil. 1.75 to 2.25.....	37.92

Warehouse Business.—Recently advanced prices on iron and steel are firmly maintained, with the movement out of warehouses on the increase. Local stocks of small sizes of bars, flats, concrete bars, etc., continue broken, shipments from the mills still being backward. Substitution of iron for steel bars is noted in certain sizes. The higher prices for bolts and nuts, put into effect recently, has stimulated rather than hurt business. Small rivets have again advanced, now being quoted at 50 per cent discount, as against 50 and 10 per cent, heretofore. Wood screws are approximately 2½ points higher.

Jobbers quote: Soft steel bars, \$3.25 per 100 lb. base; flats, \$3.85; concrete bars, \$3.25; structural steel, \$3.25 to \$3.50; tire steel, \$4.50 to \$4.85; open-hearth spring steel, \$5 to \$6.50; crucible spring steel, \$12; steel bands, \$4.25; hoop steel, \$4.75; cold rolled steel, \$4 to \$4.50; refined iron, \$3.25; best refined iron, \$4.50; Wayne iron, \$5.50; Norway iron, \$6 to \$6.50; plates, \$3.35 to \$3.55; No. 10 blue annealed sheets, \$4.15 per 100 lb. base; No. 28 black sheets, \$5.40; No. 28 galvanized sheets, \$6.40.

Finished Material.—Slightly more activity is noted in construction, but individual tonnages of structural steel required in most cases are small. The Edison Co.'s requirements for its South Boston plant addition, approximately 950 tons, is expected to be placed this week. Bids have been asked on 235 tons for a Lowell, Mass., bridge by Fay, Spofford & Thorndike, Boston engineers. Mills report a better demand for plain material from shipyards and structural steel concerns. Warehouse supplies apparently are in good condition. The demand for plates is active in point of number of orders received, but aggregate tonnages are small. The plate market here is 2¼c. to 2½c., Pittsburgh. The city of New York has placed an order for 15 trackless trolley cars, costing \$12,000 each, with the Osgood-Bradley Car Co., Worcester, Mass.

Coke.—Both the New England Coal & Coke Co. and the Providence Gas Co. are making freer shipments of by-product foundry coke on contract, notwithstanding increased demands upon them due to a larger aggregate melt in this territory. New England foundries therefore show less interest in foreign and in Alabama fuel, but firms handling these coke have no difficulty in disposing of stocks in transit and due to arrive, to public utilities, coal dealers, etc. Although New England coke producers are making a better showing on contracts, they remain practically out of the market for spot business. Connellsville foundry coke sold in carlots the past week, first at \$14.50 ovens, and subsequently at \$12.50, the latter price representing slightly better than \$18 delivered, contrasted with \$16.50 delivered for New England by-product fuel.

Old Material.—The market is more active than noted in some time, possibly two years or so. Greater activity would exist, were the car supply better, dealers being forced to exercise more or less caution in making purchases because railroads cannot guarantee cars. The better demand, coupled with a limited supply of certain materials, caused an appreciable strengthening in values the past few days, the market bordering on a runaway affair. For shipment to the Pittsburgh district, \$14 shipping point is the common offer for heavy melting steel, whereas early in the week \$11 was paid for shipment to eastern Pennsylvania. As high as \$14 shipping point is offered for No. 1 yard wrought for eastern Pennsylvania delivery. The last actual business put through was at \$13.50. No. 1 railroad wrought easily commands \$15 to \$15.50 shipping point, 50c. a ton more than a week ago. Car wheels and bundled skeleton have jumped \$1 a ton, and re-rolling rails and shafting are 50c. dearer. Dealers paid \$9 shipping point for cotton ties for eastern Pennsylvania consumption. Prices on machine shop turnings take a wider range than heretofore. If suitable for rolling mills, \$11 usually is bid, otherwise the market is 50c. a ton or more less. The best bid reported on chemical borings is \$15.50 shipping point, \$1.50 higher for the week. Actual sales of borings, steel turnings and mixed borings and turnings are limited, however, due to their scarcity. One local melter offers \$10 shipping point for steel turnings, but New England consumers of old material in most cases have withdrawn from the market. Inquiry for machinery cast is on the increase, with prices easily \$1 higher and no increase in tonnage coming out. A sale of No. 1 and No. 2 mixed machinery cast, the first reported in several months, at \$17.50 delivered New England is noted.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast.....	\$21.00 to \$22.00
No. 2 machinery cast.....	19.00 to 20.00
Stove plate.....	16.00 to 16.50
Railroad malleable.....	16.00 to 16.50

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.....	\$13.50 to \$14.00
No. 1 railroad wrought.....	15.00 to 15.50
No. 1 yard wrought.....	13.00 to 13.50
Wrought pipe (1 in. in diam., over 2 ft. long).....	9.75 to 10.25
Machine shop turnings.....	9.75 to 11.00
Cast iron borings, rolling mill.....	10.50 to 11.00
Cast iron borings, chemical.....	14.00 to 15.50
Blast furnace borings and turnings.....	9.75 to 11.00
Forged scrap and bundled skeleton.....	10.00 to 10.50
Street car axles and shafting.....	18.50 to 19.50
Street car wheels.....	16.00 to 16.50
Re-rolling rails.....	13.00 to 13.50

Cincinnati

Southern Iron Advances \$2—Conditions Improve Very Slowly

CINCINNATI, Sept. 19.—While there were a few round tonnage lots disposed of during the past week, the market as a whole was quiet, and little inquiry is now before the trade. The lull in buying is accounted for by the feeling on the part of melters that with the railroad strike on the verge of being settled, iron will move more freely, and shipments now under contract will come through. The situation in the South, while showing some improvement, still remains very much unsettled, as some roads serving the iron producing centers are not parties to the settlement, and the settlement of the Southern Railway has not yet had any effect. Though buying is light, prices remain very firm, and Southern iron is at least \$2 a ton higher at \$27, Birmingham base, with some furnaces asking \$28 to \$30. Some tonnage was booked early in the week at \$25, but this price has been withdrawn, and the interest making it is understood to be holding for \$27.50. In the North \$32 is the minimum figure at which iron can be purchased, and in some districts \$36 has been quoted. More important sales during the week included one of 5000 tons of malleable to a northern Ohio interest from a Lake furnace, and 1500 tons of foundry to a central Ohio melter, both sales being reported at \$32. An Indiana melter bought 500 tons of malleable from a Chicago district furnace at \$32, furnace, and a sale of foundry iron was made to an Indiana stove manufacturer on the same basis. Two sales of silvery iron, 300 tons each, were made at \$41.50 for 8 per cent. A sale of basic, estimated at 10,000 tons, is reported to have been made by a Southern interest to a Middle Western steel manufacturer on the basis of \$27, Birmingham. Jisco furnace at Jackson will blow in on Sept. 25 on silvery, and Belfont furnace at Ironton on Bessemer during the present week.

Based on freight rates of \$4.05 from Birmingham and \$2.27 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base).....	\$21.05
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)....	31.55
Ohio silvery (nominal), 8 per cent.....	43.77
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)...	34.27
Basic Northern	32.27
Malleable	34.27

Finished Material.—An increasing demand for finished materials is evident, and the aggregate tonnage booked last week was fully up to the average set before the rail and coal strikes slowed up general business conditions. While the orders generally were from carload lots to 200 tons, several of 500 tons are reported, and one for 1000 tons of plates was placed by a safe manufacturer. Several 500-ton shape inquiries are current, and a car manufacturer is in the market for 1500 tons of plates for car repair work. A spring manufacturer is also inquiring for 500 tons of spring steel for fourth quarter. The demand for sheets is being steadily maintained, and independent mills continue to quote for October delivery only. Prices on sheets continue to range from 2.50c. to 2.75c. for blue annealed, 3.35c. to 3.75c. for black, and 4.35c. to 4.75c. for galvanized. On automobile body sheets, the range to-day is 4.75c. to 5c. It is expected that tin plate prices will be advanced shortly to approximately \$5 per base box. The demand is expected to be heavy, particularly from the Northwest, where a great part of the fruit crop was left on the ground this year owing to failure on the part of container manufacturers to supply sufficient cans to take care of it. On bars and plates, 2.25c. is easily done, as most of the orders placed this week were at this figure. Bars, however, were available in the early part of the week at 2.15c. for rather indefinite delivery. Plate prices are very firm at 2.25c. Shapes, however, continue to lag for some unexplainable reason, and 2c. can still be done from several independent mills. Wire prices generally are up approximately \$3 per ton, and we note a sale of 100 tons of plain wire at \$2.50 per 100 lb. Nails are firm at \$2.50 to \$2.75, per keg, base, and while most of the jobbers are covered by contracts at the lower figure, sales are now being made at the higher price. There

is a fair demand for track fastenings, particularly small spikes, but light rails are inactive. The demand for pipe is steady. A number of fair-sized awards were made in the structural field, but new inquiries are few.

Warehouse Business.—Local jobbers continue to report a good volume of business. Inability of mills to secure cars in which to make shipments is proving a boon to the warehouse trade, and stocks, as a result, are moving very fast. The number of inquiries from outside the Cincinnati district is steadily increasing, and bids fair to continue. There have been no further price changes, and jobbers do not expect further advances.

Cincinnati jobbers quote: Iron and steel bars, 2.95c. base; reinforcing bars, 3.05c. base; hoops, 4.05c. base; bands, 3.85c. base; shapes and plates, 3.05c. base; cold-rolled rounds, 3.75c. base; cold-rolled flats, squares and hexagons, 4.25c. base; No. 10 blue annealed sheets, 4c.; No. 28 black sheets, 4.70c.; No. 28 galvanized sheets, 5.75c.; No. 9 annealed wire, \$2.85 per 100 lb.; common wire nails, \$3.05 per keg, base.

Tool Steel.—A slight improvement in the demand for tool steel is noted, but orders are largely of the hand to mouth variety. However, with the railroad strike settled and prospects of increasing activity among local manufacturing plants, a better demand for tool steel is expected. Prices are unchanged, high speed steel being generally quoted at 70c. per lb., base.

Coke.—There is little activity in the coke market, though prices are holding very firm. Inquiry is light. Most producers have a comfortable order book. Production is not increasing to any extent in New River or Wise County, as difficulty is still being experienced in moving coal. Prices are unchanged from last week.

Old Material.—The scrap market was very active during the early part of the week, and prices moved up sharply on some grades, but offerings by the smaller dealers had the effect of softening the market, and as a result prices lost most of their gain. There is still a good demand for cast grades, and steel plants outside the district are inquiring for blast furnace and rolling mill grades. Many plants that have been embargoed are now open, and scrap is moving in fair volume. Offerings by producers are light. Prices are not quotably changed.

We quote dealers' buying prices, f.o.b. cars Cincinnati:

Per Gross Ton	
Bundled sheets	\$9.50 to \$10.00
Iron rails	15.50 to 16.00
Relaying rails, 50 lb. and up.....	26.50 to 27.00
Rails for rolling.....	14.50 to 15.00
Heavy melting steel.....	15.00 to 15.50
Steel rails for melting.....	14.00 to 14.50
Car wheels	17.00 to 17.50
Per Net Ton	
No. 1 railroad wrought.....	13.50 to 14.00
Cast borings	10.50 to 11.00
Steel turnings	9.50 to 10.00
Railroad cast	16.00 to 16.50
No. 1 machinery.....	19.50 to 20.00
Burnt scrap	10.50 to 11.00
Iron axles	19.50 to 20.00
Locomotive tires (smooth inside)....	12.50 to 13.00
Pipes and flues.....	7.50 to 8.00

Buffalo

Blast Furnace Operations Increased by Two Stacks—Sales Light

BUFFALO, Sept. 19.—Furnace operation in this district is strengthened by the addition of two stacks this week. The Donner Steel Co. is placing one stack in blast to run on basic iron and the Hanna Furnace Co., operating the Buffalo Union plant, is placing a foundry iron furnace in operation. This operation is not due to any increased demand, but the fuel situation is more encouraging and contracts now on the books call for this addition to active stacks. Sales and inquiry are extremely light. The only furnace having merchant iron for sale has sold tonnages of No. 2 plain at \$33 and ranging from that figure to \$35. Sales are scattered and none of the large consumers is in the market. There is not enough activity at present to have any effect on the present schedule of prices. One interest which has occasional lots of high silicon iron for its regular trade has sold carload lots of silicon 3.25 to

3.75 at \$38 and silicon 3.75 to 4.25 at \$39, but these transactions were for immediate coverage of urgent needs. The American Locomotive Co. inquiry for 1400 tons has not been filled in the Buffalo district up to date.

We quote f.o.b. per gross ton Buffalo as follows, the higher prices being for early shipment:

No. 1 foundry, 2.75 to 3.25 sil.....	\$35.00 to \$36.00
No. 2X foundry, 2.25 to 2.75 sil.....	34.00 to 35.00
No. 2 plain, 1.75 to 2.25 sil.....	34.00 to 34.50
Basic	34.00
Malleable	36.00
Lake Superior charcoal.....	36.25

Warehouse.—Heavy bars are in especial demand at warehouses and all products generally are moving briskly. The unusual call for bars of large sizes is due to the fact that mills are not rolling these sizes. Certain sizes in mills are difficult to buy.

Finished Iron and Steel.—Several sellers are able to take bar business on a wider plane than has existed in this vicinity since last spring, but the situation is far from normal. Demand is unabated for practically all products and sheet business is especially brisk. The leading local sheet maker is quoting 3.50c. base for No. 28-gage blacks and all quotations are for delivery at convenience of the mill. A local bar maker quoting a minimum price of 2.15c. is booking considerable business—as much as it can turn out. The maximum quotation by this maker is 2.25c. Some attractive 300 and 400-ton loads have been booked.

We quote warehouse prices, Buffalo, as follows: Structural shapes, 3.10c.; plates, 2.90c.; soft steel bars, 3c.; hoops, 4c.; bands, 3.80c.; blue annealed sheets, No. 10 gage, 3.90c.; galvanized steel sheets, No. 28 gage, 5.85c.; black sheets, No. 28, 4.85c.; cold rolled round shafting, 3.95c.

Old Material.—Heavy melting steel and other products have been advanced in price brought about by a very active demand by all the mills. Dealers, however, are reluctant to sell, believing that heavy melting steel will go higher, some estimating that it will touch the \$25 mark before long. Higher prices prevail outside the district. Government restriction on the use of coal cars is seriously interfering with the movement of scrap. There is a pronounced shortage in the production of cast iron borings and machine shop turnings.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel.....	\$18.00 to \$18.50
Low phos., 0.04 and under.....	20.00 to 21.00
No. 1 railroad wrought.....	18.00 to 19.00
Car wheels	21.00 to 22.00
Machine shop turnings.....	13.50 to 14.50
Cast iron borings.....	15.00 to 16.00
Heavy axle turnings.....	16.50 to 17.50
Grate bars	15.50 to 16.00
No. 1 bushelling.....	16.00 to 16.50
Stove plate	16.50 to 17.00
Bundled sheet stampings.....	12.50 to 13.00
No. 1 machinery cast.....	20.00
Hydraulic compressed	16.50 to 17.00
Railroad malleable	19.50 to 20.00

Birmingham

Very High Prices Obtained for Limited Ton-nages of Pig Iron

BIRMINGHAM, ALA., Sept. 19.—Sales in the Birmingham pig iron market last week included 1000 tons for a pipe maker at \$27 and numerous lots of 200, 300, 400 tons at \$27.50 and \$28. As high as \$29.50 base was gotten on a special grade of iron. Total sales approximated 4000 tons in addition to what may have been made of Alabama iron stored at Providence, R. I. The largest foundry maker withdrew from the market at beginning of the week and that left all selling foundry makers quoting and selling at not under \$27.50. It is claimed that reports of \$25 Birmingham iron sales made last week were based on business done the week before and not during the current week in which reported. The car situation is still very bad and deliveries are slow and uncertain. The inquiry during the week was not especially active and large pipe makers have been especially quiet. Only one maker has much unbooked tonnage for this year. The Tennessee company will blow in its No. 1 furnace at Ensley this week. It has been rebuilt and enlarged and its stated capacity is 550 tons, but it will probably average much more

than that, one small stack at Ensley having attained a production of 600 tons a day. The company having consumed all the basic iron on hand last month as well as the make of six furnaces, will probably blow in No. 1 on basic. The Central Iron & Coal Co. has advanced wages of furnace, mine and pipe shop workers 20 per cent effective Sept. 1 in line with advances made by other operators. The Southern melt has been curtailed to an extent by difficulty in securing pig iron on account of the car shortage, but, so far as this allows, iron-using plants are very close to a 100 per cent turn.

New Freight Rates

The lower rates to St. Louis, Chicago and Iowa points on Sheffield and Florence iron of the Sloss-Sheffield Steel & Iron Co. published by the Arrow Transportation Co. and the Burlington system were allowed by the Interstate Commerce Commission and went in effect Sept. 15. They are: To St. Louis, \$3.28 vs. former rate of \$3.85; to Chicago, \$4.18 vs. former rate of \$4.99. It is expected that other roads will come to the position of the Burlington. The Sloss-Sheffield Steel & Iron Co. will load 2000 tons of northern Alabama iron for delivery by this route during the week.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, silicon 1.75 to 2.25.....	\$27.00 to \$28.00
Basic	27.00 to 28.00
Charcoal, warm blast.....	32.00 to 34.00

Cast Iron Pipe.—The pipe markets have been quieter. Sanitary pipe jobbers are holding off pending reception of some of their numerous consignments somewhere in transit. The United States Cast Iron Pipe & Foundry Co. took 800 tons for Detroit and smaller tonnages for Southern municipalities. Its production at Anniston and Chattanooga has been curtailed through irregular shipments of iron. The De Lavaud pipe has not yet figured in contracts entered into. The pressure base is \$40 and sanitary base \$60 to \$65.

Finishing Mills.—The South has a new car building plant, the Virginia Bridge & Iron Co. having completed its car making adjunct to its structural steel works in Birmingham and secured these initial contracts: Rebuilding 500 composite cars for the Seaboard Air Line, rebuilding 500 steel hopper cars for the Central of Georgia Railroad and building 100 steel flat cars for the latter. The Tennessee company's double turn schedule in finishing mills is continued and independent steel plants are on full turn in finishing departments. The Tennessee company shipped 3000 tons of sulphate of ammonia, 500 tons of pig iron and 3000 tons of steel rails and track accessories to Yokohama, Kobe, Shanghai and Chemulpo out of Mobile last week.

Old Material.—The scrap market has been very excited on nervous jumps up and down, mostly up, but does not know just how to mark up. Yard men are slow in closing large contracts on expectancy of hardening of new base prices.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails	\$17.00 to \$19.00
No. 1 steel.....	16.00 to 18.00
No. 1 cast.....	18.00 to 20.00
Car wheels	18.00 to 20.00
Tramcar wheels	17.00 to 19.00
Stove plate	16.00 to 17.00
Cast-iron borings	8.00 to 9.00
Machine shop turnings.....	9.00 to 10.00

Scrap Advances at Detroit

DETROIT, Sept. 19.—Advances have been recorded on practically all grades of scrap with automobile cast leading the list. This material is much in demand and sales have been made as high as \$25.00 per net ton. Hydraulic compressed registered an advance of \$1.50 per ton and No. 1 machinery cast advanced \$2.00 per ton. The following prices are on a gross ton basis f.o.b. cars producers' yards, excepting stove plate, automobile and No. 1 machinery cast, which are quoted on a net ton basis:

Heavy melting steel.....	\$15.50 to \$16.00
Shoveling steel	14.75 to 15.75
No. 1 machinery cast.....	17.50 to 18.50
Cast borings	12.00 to 12.00
Automobile cast scrap.....	24.00 to 25.00
Stove plate	14.50 to 16.00
Hydraulic compressed	14.50 to 15.50

St. Louis

Inquiries for 13,500 Tons of Basic—Southern Prices Higher

ST. LOUIS, Sept. 19.—The pig iron market is particularly strong, with more orders placed than during the preceding week. A number of melters are seeking iron for immediate shipment, and more interest is being shown in prompt-shipment iron than in future shipments. The market is unchanged on Northern iron at \$32 f.o.b., Chicago, while the market on Southern iron has advanced to \$27 to \$28, f.o.b., Birmingham. A shipment of 1200 tons of Southern iron made at Sheffield was moved by water to Metropolis, Ill., thence by rail to St. Louis during the week, and an additional sale by the same maker for St. Louis shipment totaled several hundred tons during the week. A few cars moved by all-rail from Birmingham via the Louisville & Nashville Railroad. The principal transaction of the week of the Granite City maker was the sale of 1,000 tons of foundry iron to an East Side melter and various lots ranging from 100 to 200 tons and totalling about 800 tons of low silicon iron, which were taken in the absence of standard grades which were not available. A number of melters are negotiating for additional tonnages without sending out inquiries. The principal inquiry before the market is for 10,000 tons of basic for melt at a point outside of the territory usually covered by the St. Louis maker, and 3500 tons of basic to another point outside the territory. Many melters are seeking high silicon iron, which is not available from the Granite City maker.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices \$2.16 freight from Chicago and \$5.17 from Birmingham and 81 cents average switching charge from Granite City:

Northern foundry, sil. 1.75 to 2.25...	\$32.16
Northern malleable, sil. 1.75 to 2.25...	32.16
Basic	32.16
Southern foundry, sil. 1.75 to 2.25....	\$32.17 to 33.17

Finished Iron and Steel.—Reports from steel mills tell of improvement in production conditions, and concerns that have been out of the market are now looking for "desirable" business. But orders are not so plentiful. Steel ordered now can hardly be delivered until November or December, and jobbers, especially, are not inclined to buy for such deliveries. The principal railroad item is the inquiry of the Missouri-Kansas-Texas Railroad for 10,000 tons of 90-lb. rails for delivery next August, and it is understood that it is having difficulty in placing the business at present prices for delivery so far off. The St. Louis & San Francisco bought 500 tons of plates at better than \$2.25, Pittsburgh. The Missouri Pacific Railroad bought 1,000 kegs of track spikes and the Mobile & Ohio 900 kegs. It is expected that bids will be asked this week on the new building of the Broderick & Bascomb Rope Co., involving a considerable tonnage of re-inforcing bars.

For stock out of warehouse we quote: Soft steel bars, 2.90c. per lb.; iron bars, 2.90c.; structural shapes, 3c.; tank plates, 3c.; No. 10 blue annealed sheets, 4.10c.; No. 28 black sheets, cold rolled, one pass, 4.85c.; cold drawn rounds, shafting and screw stock, 3.90c.; structural rivets, 3.60c. per 100 lb.; boiler rivets, 3.70c.; tank rivets, $\frac{7}{8}$ in. and smaller, 60 per cent off list; machine bolts, large, 50 and 10 per cent; smaller, 50-10 and 10 per cent; carriage bolts, large, 55-5 per cent; small, 60 and 10 per cent; lag screws, 60 per cent; hot pressed nuts, square or hexagon blank, \$3.50; and tapped, \$3.25 off list.

Coke.—The demand for coke is steadily increasing, with the call for domestic coke overwhelming. The Granite City by-product foundry coke is quoted at \$14.00 at the furnace, but the company has withdrawn from the market. Coal is moving very poorly into this market.

Old Material.—The market for old material has advanced considerably during the week, which was featured by heavy purchases. The Scullin Steel Co., National Enameling & Stamping Co., and the American Steel Foundries are reported to have bought 15,000 tons each, while the Helmbacher Forge & Rolling Mills Co. bought 10,000 tons. No old material is coming in, and users are relying entirely upon the local yards,

whose stocks are almost depleted. One of the largest yards in the district has sold all of its stock on hand.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton

Old iron rails.....	\$20.50 to \$21.00
Rails for rolling.....	20.75 to 21.25
Steel rails, less than 3 ft.....	20.00 to 20.50
Relaying rails, standard section.....	26.00 to 29.00
Cast iron car wheels.....	24.50 to 25.00
No. 1 heavy railroad melting steel.....	18.50 to 19.00
No. 1 heavy shoveling steel.....	18.00 to 18.50
Ordinary shoveling steel.....	18.00 to 18.50
Frogs, switches and guards cut apart	20.00 to 20.50

Per Net Ton

Heavy axles and tire turnings.....	12.75 to 13.25
Steel angle bars.....	18.00 to 18.50
Iron car axles.....	26.00 to 26.50
Steel car axles.....	20.50 to 21.00
Wrought iron bars and transoms.....	20.50 to 21.00
No. 1 railroad wrought.....	17.50 to 18.00
No. 2 railroad wrought.....	17.00 to 17.50
Railroad springs.....	21.00 to 21.50
Steel couplers and knuckles.....	21.00 to 21.50
Cast iron borings.....	11.00 to 11.50
No. 1 busheling.....	13.50 to 14.00
No. 1 railroad cast.....	21.50 to 22.00
Railroad malleable.....	19.75 to 20.25
Machine shop turnings.....	9.50 to 10.00

San Francisco

Mild Interest in Foreign Pig Iron—Effects of Strikes Seen in Finished Materials

SAN FRANCISCO, Sept. 19.—The pig iron market along the Coast continues rather quiet. There is a moderate interest in foreign offerings, which at the moment are abundant, but the volume of sales recently has not been large. It appears that consumers have about taken their requirements for the time being, and under present conditions do not feel sufficiently secure of the trend to warrant liberal purchasing. Moreover, steamer space from England is available only in very limited amount during September and October. What little new business was reported, perhaps around 500 tons for San Francisco and Los Angeles, was transacted on a basis of close to \$29, ex-ship, coast ports. It is understood there are a few offerings in the market at present for material analyzing 1.75 to 2.25 silicon, 0.05 sulphur, 0.020 to 0.040 phosphorus and 0.08 to 0.10 manganese, at around \$27, c.i.f., San Francisco. Very high quotations from the East and South make business in domestic pig iron impossible. Even by water, with iron at about \$20 at producing point, freight and incidental charges bring the total much higher than prices at which foreign material is offered.

Cast Iron Pipe.—Water pipe has been advanced again in this district, and prices are now around \$54 for 6-in., delivered, and \$58 for 4-in. Business continues rather small, especially from private sources. Some few prospects from municipalities are in sight, but the tonnage involved is not of much consequence. Los Angeles awarded the contract for 3000 tons to the National Cast Iron Co. Santa Barbara is inquiring for 900 tons of mixed sizes. There are no new developments in the soil pipe market, and mills are not encouraging business, having already more than can be conveniently handled.

Finished Iron and Steel.—Strike conditions are brought home to buyers in this section principally through advancing prices and uncertain deliveries. Virtually every product is reflecting the strong tone of the market, but buyers are becoming more hesitant with each price advance, for they apparently do not feel justified in making large purchases, believing that with an early settlement of the deadlocks, prices will readjust themselves quickly. That opinion, however, is gravely questioned by many of the sellers, who point to higher wages and the serious check which both the steel industry and transportation have received. A little business in plates has been done at prices ranging from 2.60c. to 3c., delivered, according to mill and delivery. An oil company is inquiring for around 200 tons for several phlange and dish heads, 12 ft. in diameter. The Steel Corporation was awarded about

850 tons of 75-lb. A.S.C.E. rails, with fittings, to be used on the San Pedro harbor work. The rails are understood to have gone at about \$44 net. Sheets have been quiet, and not much interest is reported in shapes at prices as high as 2.75c. Rivets have been advanced to 3c. to 3.10c., Pittsburgh. Structural steel demand is holding up pretty well at the new prices. The Baker Iron Works was awarded a contract involving 700 tons in the South. The bascule bridge planned for Badger Avenue, Los Angeles, will require about 2200 tons of material. Bids open Sept. 29. The city of Sacramento is planning to add to its facilities a filtration plant, with a capacity of 50,000,000 gallons per 24 hours, at a cost of approximately \$800,000.

Coke.—About the same condition that prevails in pig iron applies to coke. New contracts are lighter in volume, only a meager business of this nature being reported. Spot material, however, is more active, and quite a trade, in 5-ton to carload lots, has been done. Spot is quoted from about \$26 to \$27, ex-yard and imports range from \$17 to \$20, ex-ship, according to quality. Under prevailing conditions, interest in domestic coke is negligible. The U. S. Navy is in the market for about 150 tons of coke for its Mare Island base, bids closing September 7.

Old Material.—The scrap market here appears to be in a good position, although sales have not been particularly large during the past week or two. Unsettled conditions in the East, doubtless, are tending to give some strength to the situation on the Coast, and prices on both cast and heavy melting material are well maintained at \$11 per gross ton, delivered, for the latter and close to \$24 per net ton, for cast. Ship scrap is coming on the market soon.

Cleveland

Sales of Moderate Tonnages of Pig Iron—Scrap Again Advances

CLEVELAND, Sept. 19.—Blast furnace operations continue to increase with the easing of the fuel situation. The American Steel & Wire Co. has started another stack in Cleveland, now operating three out of four Central furnaces and the Hanna Furnace Co. will blow in its Dover and the second Detroit stack this week, the latter furnace having been out of blast for a long time. This will make seven more active furnaces, four of them merchant stacks, than were being operated by Cleveland interests at the time of the coal strike settlement. None of the seven furnaces resuming operations will use Connellsville coke. The movement of bituminous coal has become heavy and as a result the car shortage for other products has become more acute. This is noticeable particularly in the shipment of pig iron against which a number of railroads have embargoes. It is also interfering with steel shipments from the Pittsburgh district. The suspension of operations by the Ford Motor Co. so far has not resulted in the holding up of shipping orders for pig iron by producers having Ford contracts and with but few suspensions of steel going directly to the plants making Ford parts. The Ford company has instructed its parts manufacturers to accumulate a backlog of finished parts, so that car production will not be delayed when the Ford plant starts up.

Iron Ore.—The wage advance of the U. S. Steel Corporation in the Lake Superior mining district ranges from 10 to 15 per cent above the old scales, as is shown by the rate sheets issued during the past few days. The wage rates in the mines have generally been higher than in the mills, which evidently explains why the miners were not given the 20 per cent increase granted common labor in the mills. Some of the independent mining companies will place corresponding wage advances in effect. Ore shipments are tapering off considerably. One large shipper has made a 10 per cent cut in maximum tonnages of outside vessel capacity it had contracted to take. One furnace that is resuming operations has commenced to take ore off the docks, but

most furnaces have large yard stocks. With curtailed blast furnace operations stocks of Lake Superior iron ore at furnace yards increased over 5,500,000 tons in August. The amount on hand at furnaces Sept. 1 was 29,565,935 tons as compared with 23,830,461 tons on Aug. 1. The amount at furnace and Lake Erie docks Sept. 1 was 37,630,036 tons as compared with 31,127,303 tons on Aug. 1 and with 35,486,757 tons on Sept. 1 last year. The above figures appeared in the monthly report of the Lake Superior Iron Ore Association, which also shows a falling off of nearly 1,000,000 tons in the consumption of lake ore in August, the amount consumed during that month being 2,589,251 tons as compared with 3,582,715 tons in July.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, \$5.95; Old range non-Bessemer, 51½ per cent iron, \$5.20; Mesabi Bessemer, 55 per cent iron, \$5.70; Mesabi non-Bessemer, 51½ per cent iron, \$5.05.

Pig Iron.—The market continues fairly active in foundry and malleable grades. Prices on these grades are the same as quoted last week and while the market is very firm, there seems to be a disinclination among sellers to move prices to any higher level. A Pittsburgh district sanitary interest has purchased 1500 tons of No. 2X iron for October shipment from a Cleveland producer at \$36.50, Cleveland, or at the base price of \$36. The same interest which is offering iron only for October shipment also took a number of orders in Cleveland and vicinity at the same price. The Westinghouse Electric & Mfg. Co. is expected to close to-day on an inquiry for 1200 tons of foundry iron for early shipment, 1050 tons for Cleveland and 150 tons for Springfield, Mass. Another lake furnace interest reports sales of several thousand tons of foundry and malleable iron during the week for fourth quarter delivery, the prices ranging from \$32 to \$33.50 at furnaces. The orders include one 1000-ton lot of foundry iron and another for 1000 tons of malleable iron, both from Ohio melters. Southern Ohio iron is still available at \$32. The demand for high silicon foundry iron has been stimulated by the fact that foundries are not getting Alabama iron as needed because of slow shipments. In some cases it has taken over 60 days for Southern iron to reach its destination. The only activity in basic iron is the reported sale of 20,000 tons by a Valley steel maker at \$34. There was considerable activity during the week in Southern iron, one interest making a number of sales in this territory in lots of 400 tons and under at \$25, Birmingham. Late in the week the price was raised to \$28 and some business was booked at that base price. For iron running 2.25 per cent and higher in silicon, this seller is quoting 50c. differential or \$28.50.

Quotations below are f.o.b. local furnace for Northern foundry iron, not including a 50c. switching charge. Other quotations except basic and low phosphorus are delivered Cleveland, being based on a \$3.02 rate from Jackson and a \$6 rate from Birmingham:

Basic, Valley furnace, nominal.....	\$34.00
Northern No. 2 fdy., sil. 1.75 to 2.25.....	36.00
Southern fdy., sil. 1.75 to 2.25.....	31.00
Malleable	36.00
Ohio silvery, sil. 8 per cent.....	44.52
Standard low phos., Valley furnace.....	38.00

Semi-Finished Steel.—No quotations are being made on semi-finished steel in this territory, although there is considerable inquiry for fourth quarter contracts. With an advance in basic pig iron, the market on billets, sheet bars and slabs is regarded as around \$44.

Finished Material.—With increasing steel production, buyers are showing less disposition to pay the maximum prices, particularly on steel bars and structural material. While mills that are quoting these at 2c. for delivery in 30 to 60 days are getting a heavy volume of orders, others that are asking 2.25c. are booking very little business, although in some cases as high as 3c. is being paid for steel bars in small sizes for quick shipment. Plates continue in good demand, with quotations ranging from 2c. to 2.50c., most of the larger orders for early delivery going at 2.25c. The Gulf Refining Co. is inquiring for stills requiring 600 tons of plates and another new inquiry has appeared for stills that will require 360 tons. The \$3 a ton advance on steel rails by the Steel Corporation has brought

no announcement from the independent mills as to their attitude on rail prices. It is expected that some of the railroads in this territory will close for their 1923 rail requirements before Oct. 1, when the advance goes into effect. The leading interest has also made a \$3 per ton advance on light rails to 2.15c. The Illinois Steel Co. has announced a \$2 a ton advance on track bolts to 3.85c., and on spikes to 2.85c. Splice bars will be advanced Oct. 1 to 2.75c. Sales of wire rods are reported at \$46. In the building field there is a falling off in inquiries and some work on which bids were received is being held up. One large inquiry has appeared, being for 5000 tons of structural material for a plant for the Toledo Libby-Owens Sheet Glass Co., Toledo. With the approach of the winter the demand for reinforcing bars in round lots has fallen off, but considerable business continues to come out in small lots. Hard steel reinforcing bars are unchanged at 2c.

Jobbers quote steel bars, 2.81c.; plates and structural shapes, 2.91c.; No. 9 galvanized wire, 3c.; No. 9 annealed wire, 2.50c.; No. 28 black sheets, 4.25c.; No. 28 galvanized sheets, 5.25c.; No. 10 blue annealed sheets, 3.50c. to 3.61c.; hoops and bands, 3.61c.; cold-rolled rounds, 3.60c.; flats, squares and hexagons, 4.10c.

Sheets.—While some independent mills are now asking higher prices, others are adhering to 3.50c. for black, 4.50c. for galvanized and 2.60c. for blue annealed sheets. There is a fair demand for sheets for prompt shipment, but the seasonal falling off in orders from the automobile field is noticeable.

Bolts and Nuts.—Specifications on contracts taken at the old prices that expire Oct. 1 are heavy, and manufacturers are booking a great deal of business in fourth quarter contracts. Prices are firm. Production by some manufacturers is curtailed by a shortage of wire and steel bars. Rivet manufacturers are getting a good volume of orders, particularly from locomotive manufacturers, and are closing many contracts for the fourth quarter at the recent advance in prices. The market is very firm.

Coke.—Connellsville foundry coke is still held at \$13 with a supply sufficient to meet the demand, which is light. We note the sale of 25 cars of Indianapolis by-product coke to a Cleveland consumer at \$16. No activity is reported in furnace coke. Furnaces in this territory that have resumed operations or will start up this week are using by-product coke.

Old Material.—Heavy melting steel scrap has further advanced \$1 per ton and most grades were marked up from 50c. to \$1 per ton or more during the week. With the limited supply of scrap and the scarcity of pig iron and higher prices, the trend of the market still seems to be upward and dealers and producers are holding for a further advance. Valley dealers are offering \$21 for heavy melting steel and a Youngstown mill is understood to have offered the same price. Some dealers are asking \$22 for this grade for Valley delivery. A Cleveland dealer bid \$21.60 delivered Youngstown to a Sharon producer for heavy melting steel scrap, but evidently was outbid. Local dealers have paid \$19 for heavy melting steel scrap and \$19.50 is understood to have been offered. Outside of heavy melting steel, turnings and borings are the more active items. Sales of machine shop turnings at \$14 and mixed borings and short turnings at \$14.50 are reported.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel.....	\$18.75 to \$19.25
Steel rails under 3 ft.....	20.00 to 21.00
Steel rails, rerolling.....	21.00 to 22.00
Iron rails.....	17.00 to 17.50
Iron car axles.....	25.00 to 26.00
Low phosphorus melting.....	19.00 to 20.00
Cast borings.....	14.00 to 14.25
Machine shop turnings.....	13.75 to 14.00
Mixed borings and short turnings.....	14.00 to 14.50
Compressed steel.....	16.00 to 16.50
Railroad wrought.....	17.75 to 18.50
Railroad malleable.....	18.50 to 19.00
Light bundled sheet stampings.....	12.50 to 13.00
Steel axle turnings.....	15.25 to 15.50
No. 1 cast.....	20.50 to 21.00
No. 1 busheling.....	13.50 to 13.75
Drop forge flashings over 10 in.....	13.00 to 13.50
Drop forge flashings under 10 in.....	13.75 to 14.25
Railroad grate bars.....	16.50 to 17.00
Stove plate.....	16.50 to 17.00
Pipes and flues.....	14.00 to 14.50

Philadelphia

Railroad Requirements Loom Large in a Somewhat Halting Market

PHILADELPHIA, Sept. 19.—In some respects the iron and steel markets have come to one of those halting periods which develop when buyers expect conditions and prices to turn in their favor. It seemed to have been the opinion of many that a few weeks of large coal production would bring decided relief all along the line. That such has not yet been the case, except to a minor degree, is the cause of considerable perplexity. Sellers freely concede that prices are on too high a level for large or sustained buying, but they hesitate making reductions until costs also have gone down. Coke, which is an important factor in the situation, was expected to show quickly the effects of freer coal supply, but prices of coke weakened last week only to advance \$1 a ton this week. The firmer tone is due not to coke shortage but to shortage of cars. The opinion prevails that while there may be some easing in prices of pig iron and steel any marked tendency in that direction over the remainder of this year, at least, is unlikely because of the effect which inadequate car supply will have upon production costs and the supply of material.

The more important developments of the market have to do with railroad requirements, in which rails now figure prominently since the announcement by the Steel Corporation of an advance to \$43 per gross ton, effective Oct. 1. Independent rail producers have followed in this advance. Orders for several hundred thousand tons from Eastern roads are now pending.

Pig iron and steel are in better supply, and while there have been no marked changes in prices, the price situation is slightly easier in that the buyer no longer is obliged to pay the top prices. In scrap, sensational price advances have occurred, amounting in a few instances to several dollars a ton within the week.

Pig Iron.—With increased production of pig iron in sight, both for steel-making purposes and for foundry use, the attention of both buyers and sellers is more closely focused on the probable price situation over the remainder of the year than on the current market. Domestic iron is being offered more freely, and while concessions from the peak prices have been comparatively slight, buyers are not now paying these prices unquestioningly as they did during the most critical period of the coal strike. One Eastern furnace which went as high as \$34, base, for foundry iron is adhering to that level, but another, which also went to \$34, is now selling at a reduction of \$1 a ton, and still another furnace interest, as reported last week, is offering foundry iron freely at \$32, furnace, for No. 2 plain, \$33 for No. 2X and \$34 for No. 1X. A furnace which has been making ferromanganese produced about 1000 tons of foundry iron in preparing to bank, and this iron has been placed on the market on a \$32 base at furnace. Foreign iron continues to sell more freely than domestic grades, as more melters have found that they can use the imported iron successfully in their mixtures. There has been no weakness in prices of foreign iron, which can be had slightly below the quotations on domestic iron of similar analysis. Importation of low phosphorus iron has been a new development, a Chester steel castings plant taking 5000 tons of copper bearing iron, maximum 0.04 per cent phosphorus, at \$28.50, c.i.f. Philadelphia. A locomotive company subsidiary manufacturing forgings is also reported to have bought a tonnage of the same grade at about the same price. A small lot of imported copper free low phosphorus iron, maximum 0.035 per cent phosphorus, was sold at \$32, c.i.f. Philadelphia, and more is available at the same price. No domestic copper free low phosphorus iron is to be had in the East, but copper bearing iron is quoted at \$37 to \$38, furnace. Important sales of domestic iron within the week included 4000 tons of basic at \$30, furnace, to a

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BETHLEHEM-LACKAWANNA

Timothy M. Burns General Manager at Buffalo— Many Changes in Sales Offices

Stockholders of the Bethlehem Steel Corporation and the Lackawanna Steel Co. in special meetings Sept. 18 formally approved plans under which the latter company's property will be absorbed by the Bethlehem Steel Corporation. Although the exchange of stock will not be completed until the lapse of two or three weeks the transfer of the Lackawanna's plants to Bethlehem took place Sept. 19 and henceforth all sales will be made in the name of the latter company.

Coincident with the taking of control by Bethlehem on Tuesday, Timothy M. Burns became general manager of the plants at Lackawanna, N. Y. For some years he has been general superintendent of the Saucon plant at South Bethlehem. George W. Whitehead, who has been general superintendent of the Lackawanna plant, under the presidency of George F. Downs, who has resigned, becomes assistant general manager. The

Lackawanna operating organization as to department superintendents remains unchanged.

A number of changes in the sales department of the Bethlehem Steel Co. are announced, in view of the taking on of Lackawanna products. Edward S. Illig becomes Buffalo district sales manager, being transferred from the Bethlehem Steel Co.'s Pittsburgh office. The Buffalo sales district will hereafter include Toronto and adjacent Canadian territory, in view of the recent action by which Canada has been separated from the foreign territory covered by the Consolidated Steel Corporation. Mr. Illig's successor at Pittsburgh will be E. B. C. Goyne, heretofore in charge of sales at St. Louis. William Chapman goes from the Chicago office to take charge of sales at St. Louis. Robert E. Belknap, who has had charge of sales at Chicago, becomes manager of sales in the Boston district. He is succeeded at Chicago by E. E. Goodwillie, heretofore Bethlehem's sales manager at Cleveland. R. B. Wallace remains at Boston as assistant manager of sales. The Cleveland office hereafter will be in charge of John C. Chandler, who for a number of years has represented the Lackawanna Steel Co. in that territory. New Bethlehem sales offices will be opened at Los Angeles, Cal., and Seattle, Wash.

Consolidated Steel Corporation to Be Reorganized

The companies which have been members of the Consolidated Steel Corporation, incorporated Jan. 2, 1919, to act as their export representatives, recently decided that they would prefer to handle their export business to Canada themselves, and as this is an important part of the business of the Consolidated Steel Corporation, it has been decided to reorganize the corporation. Details have not been determined. The original member companies were: Bethlehem Steel Co., Brier Hill Steel Co., Lackawanna Steel Co., Lukens Steel Co., Midvale Steel & Ordnance Co., Republic Iron & Steel Co., Sharon Steel Hoop Co., Trumbull Steel Co., Whittaker-Glessner Co., Youngstown Sheet & Tube Co. Three other companies—the Railway Steel Spring Co., Standard Steel Works Co. and Edgewater Steel Co.—have done their export business through the corporation, although not included in its membership.

Brier Hill Steel Co. Authorizes Large Expenditure

YOUNGSTOWN, OHIO, Sept. 19.—Directors of the Brier Hill Steel Co. Tuesday authorized an expenditure approaching \$1,000,000 to rebuild the Thomas plant at Niles, consisting of 12 sheet rolling units. The rehabilitation will enlarge the Thomas plant's capacity 25 per cent. Plans include new steam drive installation, relocating rolling mills, rearranging buildings, installing new annealing furnaces and warehouses. Work is started at once and will require six months for completion.

Decision to proceed with an expansion program was withheld, but directors will meet Sept. 25 to discuss such a program.

The directors declared the usual quarterly preferred dividend of \$1.75 per share, payable Oct. 1 to stock of record Sept. 20.

The directors of the Trumbull Steel Co., Warren, Ohio, have increased the common dividend from 20 to 25c. for the third quarter, and authorized the usual quarterly preferred payment.

Stockholders of the Electric Alloy Steel Co., Youngstown, will meet Sept. 30 to ratify the merger with the Atlas Crucible Steel Co., Dunkirk, N. Y., details of which are now being completed, following four months negotiations. The merged interests will have an annual productive capacity of 45,000 tons of highspeed tool and special analysis steels. Details of financing ar-

rangements have been submitted to shareholders of both constituents.

Jones & Laughlin Steel Co. Operations

Jones & Laughlin Steel Co., Pittsburgh, recently started up 300 of its beehive coke ovens near its South Side works, Pittsburgh. The company has 1820 ovens of this type and has not operated them for about two years. The company now is making sufficient coke to meet the requirements of 10 blast furnaces and it expects to have that number active by the end of this month. The company is unusually fortunate in that its coal mines are located near the Monongahela River and it is able to bring down practically all of its production by water and escape the restrictions of railroad-snarls or priority distribution orders.

The company is making preparations for a resumption of river shipments of steel products. River transportation is difficult during the summer months, when the rivers are shallow and a number of barges sent south by this and other companies in early summer still are tied up at southern points. There will be plenty of barges for the fall shipments and with deeper water the Jones & Laughlin company and other steel makers in Pittsburgh will be partly able to overcome any railroad transportation snarls which may grow out of the lack of cars or insufficient motive power.

The Southern Wire & Iron Mfg. Co., Dallas, Tex., headed by W. A. Sedwick, has purchased seven acres of industrial property south of the city, and will build four factory units there by Jan. 1, at an estimated cost of \$50,000. Ornamental iron, structural steel, fire and elevator doors, fire escapes and miscellaneous products will be fabricated in the new plant. Seventy-five men are to be employed. The company is an old one in Dallas, and the present project is an enlargement of its activities.

Motor car production for August aggregated 272,640, by far the heaviest August production on record, and an increase of 12 per cent over July, according to reports received by the National Automobile Chamber of Commerce. It is estimated that the yearly production will reach the 2,000,000 mark.

Standard Steel Car Co., Butler, Pa., has advanced wages of workmen paid on a daily basis 15 per cent and has made a corresponding adjustment in the scales of piece and tonnage workmen, effective Sept. 16.

BRITISH IRON AND STEEL

Exports and Imports Both Increase in August Over July and June

WASHINGTON, Sept. 19.—The United Kingdom imported 80,113 gross tons of iron and steel during August and exported 269,983 tons, according to a cable received by the Department of Commerce from Commercial Attaché, Walter S. Tower, London. These figures compare with exports of 251,743 tons in July and 249,089 tons in June and with imports of 55,893 tons in July and 58,856 tons in June. The month's cargoes consisted chiefly of the following:

	Gross Tons	
	Imports	Exports
Pig iron and ferroalloys.....	15,482	46,250
Ingots, blooms, billets, slabs, etc.	21,441	451
Steel rods, bars, angles, etc....	11,245	18,087
Iron bars, rods, angles, etc....	5,972	2,702
Structural steel	5,473	4,585
Rails	1,715	22,470
Other railroad material.....	636	15,401
Plates and sheets.....	1,616	24,850
Galvanized sheets .....	.....	47,404
Tin plate .....	.....	36,817
Wire	2,941	5,893
Wire cable and rope.....	.....	1,986
Wire nails, including staples...	3,192	322
Other wire manufactures.....	329	1,509
Hoops and strips.....	2,911	4,834
Wrought tubes, pipes and fittings	2,023	8,395
Cast tubes, pipes and fittings...	1,964	8,093
Bolts, nuts, including screws for metals	391	1,803
Nails, tacks, rivets and washers	171	1,042
Rough iron and steel castings...	240	253
Rough iron and steel forgings...	139	45

Production of pig iron of all classes by the United Kingdom in August totaled 411,700 tons, and the output of steel ingots and castings was 520,800 tons. At the end of August there were 126 blast furnaces and 251 open-hearth furnaces in operation.

British Pig Iron and Steel Output for August

LONDON, ENGLAND, Sept. 16 (*By Radio*).—The production of pig iron in Great Britain in August was 411,700 gross tons and that of steel ingots and castings 520,800 tons. These compare with 399,100 tons of pig iron and 473,100 tons of steel ingots and castings in July.

The pig iron and steel output for Great Britain by months so far this year has been as follows in gross tons:

1922	Pig Iron	Steel Ingots and Castings
January	288,000	327,500
February	300,100	418,800
March	389,800	549,400
April	394,300	404,200
May	407,900	462,300
June	369,200	400,200
July	399,100	473,100
August	411,700	520,800

The August output of pig iron is the largest month of the year, while that of steel is second to the March production. The 1921 pig iron production averaged 217,600 tons per month and the steel output 302,100 tons per month. In 1913 the two figures were 855,000 tons and 639,000 tons per month respectively.

Russian Iron and Steel Production

BERLIN, GERMANY, Sept. 6.—The Russian iron and steel production is gradually improving. The supplies of ore and fuel going to the works are, however, still irregular. Production is therefore fluctuating. The figures for the first three months of 1922, for instance, were much higher than those for the second quarter.

Several great works in the South are being restarted and those already working have been able to increase their output during the present year considerably. During the first half of 1921, 69 per cent of the Russian pig iron was produced in the Ural, 11 per cent in the South, and 20 per cent in Central Russia. This year the percentage of production has changed to 44 per cent in the Ural, to 40 per cent in the South,

while the output of the works in Central Russia remained about the same.

The Russian production of pig iron during the first six months of 1922 amounted to 88,600 metric tons of which the works in the Ural produced 39,600 tons, those in the South 36,200, and those in Central Russia 12,800 tons. The whole output of open-hearth steel was 163,200 tons, and the share of the three districts amounted to 70,100 tons, 63,700 tons and 29,400 tons respectively. Rolled material was produced to the amount of 55,800 tons in the Ural, 52,600 in the South and 16,700 in Central Russia.

Export Market Dull

NEW YORK, Sept. 19.—Dullness in export trade now prevails not only in all foreign markets, but in what has recently been a fairly large item, purchases from government sources in Japan. Although the Japanese are at present evidently doing most of their buying of light gage black sheets on the Continent of Europe, they continue to manifest some interest in American material and several exporters are handling requests for quotations on standard American brands of black sheets of light gage, which they doubt will materialize into business because of price.

Purchases of rails are still about the most important of any business coming from the Far East. On a recent tender issued by a municipality in Japan, calling for 27 miles of 60-lb. rails, a bid of 524 fr. Belgian (about \$37.57) per ton, c. and f. Japanese port, was submitted by a Belgian mill and £9 2s 6d (about \$40.20) per ton, c. and f. Japanese port, which was later reduced to £9 per ton (about \$39.87) by the Krupp works in Germany. The Belgian delivery was about 16 weeks, against a promised shipment by Germany in 12 to 14 weeks. The business is not yet reported as placed. The tender of the South Manchuria Railway Co., issued several weeks ago, calling for 700 tons of tie plates for 100-lb. rails, has been awarded to the Mitsubishi Shoji Kaisha, 120 Broadway, New York, and will be filled by the United States Steel Products Co.

The Chinese market is dull, the little buying evidently being done in European markets, because of lower prices. An annual inquiry for 2,000,000 No. 26 gage black sheets, which recently came up, received a bid of £16 6s, c.i.f. Tsientsin, against the bid of the American seller of £17, c.i.f. Tsientsin. The previous year's business from this source was equally divided between American and British mills, 1,000,000 sheets to each. Companies in touch with conditions in China do not expect any general improvement in business until the political situation is more settled.

Increased Demand for Ore in Sweden

WASHINGTON, Sept. 19.—Decided improvement in the market for iron ore in Sweden has been reported to the Department of Commerce by Consul Murphy, Stockholm. By the end of June, it is stated, 460,000 more tons of ore were shipped from Narvik, one of the principal shipping ports, than at the close of June, 1921. Shipments from Lulea, another important shipping port, were considerably in excess of those of January-June, 1921. Stocks of ore at the mines have largely diminished.

German dumping is declared to be the great disturbing factor in both iron and steel. In rolled products only, it is declared, is there a noticeable return to normal prices and fair demand. Prices of iron are said to be below cost of production.

Increased exports of iron ore from the Lorraine mines are reported by Assistant Trade Commissioner Green, Paris, the total for the first six months of the present year aggregating 4,328,453 metric tons, valued at 99,000,000 francs, according to official figures. These figures indicate an encouraging increase over the export during the corresponding period of 1921, which totaled 2,666,428 metric tons, valued at 61,000,000 francs. Germany is taking an increasing proportion of the Lorraine output.

COPPER DEMAND FROM JAPAN

Speculative Stocks Are Being Absorbed and Imports from United States May Increase

TOKIO, JAPAN, Aug. 1.—In anticipation of the high price of electrolytic copper in Japan after the revised customs tariff rate was brought into force, orders for electrolytic copper had been placed in the American market and more than 10,000 tons was imported into Japan speculatively. When the revised rate of customs was enforced, the price of copper showed an improvement by 5 to 6 yen per 100 kin (133 lb.). Last spring, when the customs tariff was revised, the monthly consumption of copper was estimated at 5500 tons or more, but afterward consumption tended to decrease by degrees, and the Japanese market continued to be much affected by the excess supply. Owing to the fact that the quotation in the American market remained below 14c., the price of copper in Japan stood at about 45 yen per 100 kin (or about 17c. per lb.) in May and June last. At that time the net stocks of copper in the hands of producers, putting aside the quantity which is to be consumed in Japan, amounted to about 5000 tons.

The monthly output of the Kuhara, the Fujita, the Mitsubishi, the Furukawa, the Sumitomo and other copper companies amounts to about 3500 tons, while their monthly consumption aggregated 2500 tons, the remainder, approximately 1000 tons, being added to stock.

On the other hand, the monthly consumption of the Fujikura Copper Mfg. Co., the Denki-Bundo Kaisha and other copper manufacturers is estimated to be 1300 tons, and adding the above to the consumption of arsenals, naval yards, the Government mint and others, the consumption of copper in Japan aggregates 5000 to 5500 tons per month. Thus consumption exceeds the output by 1500 to 2000 tons monthly, which represents the amount imported. Recently the demand for copper has improved and the stocks on hand, which are partly consumed by the copper and brass goods manufacturers and partly exported to China and elsewhere, have decreased considerably. If present operations continue, stocks on the Japanese market will be drawn down in the near future. It is expected in that case that the quotation for electrolytic will become stable at 46 to 47 yen per 100 kin, if the price is maintained around 14c. on the American market.

GERMAN STEEL PRICES GO UP

Advances Made Over Figures Prevailing from Sept. 1 to Sept. 10

By Cable

BERLIN, GERMANY, Sept. 18.—Prices of ingots have gone to 34,370 marks per metric ton (\$24.44 per gross ton, at 7c. per 100 marks); of bars to 46,930 marks (1.49c. per lb.); of sheets exceeding 5 mm. (No. 6 United States gage) to 52,750 marks (1.675c. per lb.). Foundry iron is now quoted at 36,242 marks (\$25.78).

These prices replace 27,530 marks (\$21.68) for ingots; 37,020 marks (1.30c. per lb.) for bars; 41,580 marks (1.46c. per lb.) for sheets and 24,491 marks (\$19.28) for foundry iron No. 1, all figured at the rate of 7½c. per 100 marks, prevailing Sept. 2.

Railroad Charge for Placement of Ore Cars Held to Be Reasonable

WASHINGTON, Sept. 19.—In a tentative report made to-day Examiner Hunter recommends that the Interstate Commerce Commission find that the delivery charge of 3c. per gross ton on ex-lake iron ore in carload lots at the Youngstown, Ohio, plant of the Carnegie Steel Co. is applicable to placement of cars on the company's incline tracks and that it is not unreasonable. It was charged by the Carnegie company that the delivery charge does not apply on service performed by the carriers and that if such a charge is applicable it is unreasonable and should be eliminated. It was claimed that the road haul rate includes or should include placement on the incline tracks and the removal of empties to out-bound tracks.

Ohio Foundry Activities

The report of the Ohio State Foundrymen's Association, issued Sept. 16, and covering the operations of the member foundries for August, shows that operations have now reached 70 per cent of normal, as compared with 58 per cent in July. The report states that many foundries were confronted with great difficulty in maintaining operations due to a shortage of raw materials, but that some relief is now in sight. The non-ferrous foundries had been able to maintain operations throughout August practically at a normal rate, and have sufficient raw materials on hand to keep running through

September. Shipments on contracts, particularly from northern furnaces, were good during the month, but with the increased melt the stocks on foundry yards have declined to the lowest level since the organization was formed.

Iron and Steel Imports in July

More than one-third of the total tonnage of iron and steel entering the United States in July was ferromanganese and over 60 per cent was ferromanganese and pig iron. Canada and the United Kingdom, considered together, furnished us with more than 70 per cent of our total import tonnage of iron and steel items. The aggregate of 72,426 tons came from the eleven sources detailed in the table below.

Countries	Tons	Countries	Tons
United Kingdom..	30,972	China	500
Canada	19,908	Germany	231
Sweden	10,990	Virgin Islands....	145
Brazil	7,800	Dominican Repub- lic	3
Belgium	766		
France	611	Total	72,426
Netherlands	500		

It is of interest to note that the imports of ferromanganese in July, 25,841 tons, were almost as great as the 27,288 tons for the entire six months preceding. Similarly, the pig iron coming in during July, 18,828 tons, amounting to more than two-thirds of the tonnage, 26,399 tons, for the entire six months preceding. Of smaller tonnage, but more striking in the proportion entering in July, was bar iron, of which the month's tonnage amounted to 10,131 against 1400 tons in the six preceding months.

Swedish Foreign Trade in Iron Ore and Steel

The following table shows the Swedish imports and exports of iron and steel, and the exports of iron ore last June and the six months ended therewith, compared with the same periods in 1921 in gross tons:

	June, 1921	June, 1922	Jan.- June, 1921	Jan.- June, 1922
Iron ore exports.....	420,084	560,680	2,129,034	2,084,104
Iron and steel exports..	10,890	15,487	61,335	81,396
Iron and steel imports..	13,527	9,182	72,219	54,260

Copper Shipments Making Records

Shipments by American copper producers in August are reported to have exceeded 170,000,000 lb., compared with 172,418,000 lb. in July and 176,774,000 lb. in June. About 70,000,000 lb. was for export and 100,000,000 lb. for domestic consumption. The figures for these three months represent the largest shipments for any three "peace" months in the history of the industry.

British Iron and Steel Market

American Buying of British Pig Iron Has Stiffened Prices—British Steel Prices Weak in Face of Better Demand

(By Cable)

LONDON, ENGLAND, Sept. 19.

Cleveland pig iron is strong as a result of continued American demand, up to 95s. (\$21.00) being paid for No. 3 G.M.B. Better grades are practically unobtainable for prompt shipment. Most makers are quoting November as the earliest date. Home business is quiet.

Hematite is weak. East Coast mixed numbers are sold at down to 88s. (\$19.45) and stocks are accumulating.

There is improved demand for finished iron and steel, especially plates and angles, and some orders have been placed. Prices generally are unchanged, though some works are willing to grant concessions.

Continental steel generally is quiet. India and China are buying a little, but other markets are holding aloof.

Tin plate is easier on decreased sales. Makers are perturbed at falling prices and are considering cutting down production. Some small sales have been made to India, Canada, South America and Australia. There is a fair home trade demand. Odd sizes are being done at 18½s. (\$4.14) f.o.t. There is moderate inquiry for wasters, these being quoted at 16½s. (\$3.70) to 17s. (\$3.76) basis, f.o.t.

Galvanized sheets are quiet, but there are signs of improving demand. India has bought small parcels and anticipations are entertained of substantial business before long. Australia and South Africa are buying small lots steadily.

Black sheets are steady. There is some revival of demand for Japanese specifications, but sales are only meager.

We quote per gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at \$4.42 per £1, as follows:

Durham coke, delivered	£1 7s.		\$5.97
Cleveland No. 1 foundry	4 17½		21.66
Cleveland No. 3 foundry	4 12½	to £4 15s.	20.33 to \$21.00
Cleveland No. 4 foundry	4 9	to 4 10	19.67 to 19.89
Cleveland No. 4 forge	4 5		18.79
Cleveland basic	4 0		17.68
East Coast mixed	4 8	to 4 10	19.45 to 19.89
Ferromanganese	15 0		66.30
Ferromanganese*	14 10	to 14 15	64.09 to 65.20
Rails, 60 lb. and up	7 5	to 8 0	32.05 to 35.36
Billets	7 2½	to 8 0	31.38 to 35.36
Sheet and tin plate bars,			
Welsh	7 7½		32.71
Tin plates, base box	0 19	to 0 19½	4.20 to 4.25
			C. per Lb.
Ship plates	8 15	to 9 5	1.73 to 1.83
Boiler plates	11 10	to 12 0	2.27 to 2.37
Tees	9 0	to 9 10	1.78 to 1.88
Channels	8 5	to 8 15	1.63 to 1.73
Beams	8 5	to 8 15	1.63 to 1.73
Round bars, ¾ to 3 in.	9 0	to 9 10	1.78 to 1.88
Galvanized sheets, 24 g.	16 5	to 16 10	3.21 to 3.26
Black sheets	12 0		2.37
Steel hoops	11 0	& 11 10*	2.17 & 2.27*
Cold rolled steel strip,			
20 g.	23 2½		4.56
Cotton ties, Indian specifications	15 0		2.96

*Export price.

Continental Prices, All F. O. B. Channel Ports, Delivery as Specified

No. 3 foundry pig iron:			
Belgium, October	£4 5s.		\$18.79
Luxemburg, October	4 5		18.79
France, October	4 5		18.79
Billets:			
France, Oct., Nov.	5 12½	to £5 15s.	24.86 to \$25.42
Luxemb'g, Oct., Nov.	5 12½	to 5 15	24.86 to 25.42
Lorraine, Oct., Nov.	5 12½	to 5 15	24.86 to 25.42
Wire nails (keg basis):			
Germany	0 14½		3.20
Belgium	0 20½		4.53
Wire rods, 5 mm. (0.2 in.):			
Belgium	7 5	to 10 7½	32.05 to 45.97

Angles:				C. per Lb.
Belgium, September	7 7½			1.46
Tees:				
Belgium	8 5			1.63
Merchant bars:				
Belgium, Nov., Dec.	7 10	to 7 12½	1.48 to 1.51	
Luxemb'g, Nov., Dec.	7 10	to 7 15	1.48 to 1.53	
France, Nov., Dec.	7 10	to 7 12½	1.48 to 1.51	
Germany, Jan., Feb.	7 10		1.48	
Joists (beams):				
France, Oct.	6 15	to 7 2½	1.33 to 1.41	
Belgium, Oct.	6 15	to 7 2½	1.33 to 1.41	
Luxemb'g, Oct., Nov.	7 0	to 7 2½	1.38 to 1.41	
Channels:				
Belgium	7 10	to 7 12½	1.48 to 1.51	
¾-in. plates:				
Germany, Nov., Dec.	8 0		1.58	
Belgium, Sept., Oct.	7 10	to 8 0	1.48 to 1.58	
Luxemburg, Oct.	7 12½	to 7 15		
France, not offered.				
¼-in. plates:				
Germany	9 0		1.78	
No. 8 gage wire:				
Belgium, August	14 10%		2.87	

American Pig Iron Buying—More Blast Furnaces to Start—German Offer for Old Liners

LONDON, ENGLAND, Sept. 7.—The continued demand for pig iron from American consumers has led to an improved tone, and already some prices have been advanced by about 2s 6d a ton. America has been buying Cleveland, Midland and Lincolnshire material, as well as some small purchases from the continent. Scotch pig iron seems now to be too dear. In the Cleveland district there are 29 furnaces in blast, but if the demand from the United States is sustained some increase in output is likely. There is talk of relighting another seven or eight furnaces soon. No. 3 Cleveland is now quoted at 90s—for either the home trade or for export. Hematite quotations keep firm in spite of only a moderate demand, and makers still have considerable stocks to work off before increasing the output. Sellers of East Coast mixed numbers quote 89s to 91s 6d.

In the finished iron and steel market, now that the holidays are over, traders are beginning to look to some good autumn business. The home trade is showing more interest, but the export markets, particularly on the continent, are quiet. Steel makers' order books, however, are somewhat healthier, but the volume of new business is far from equal to capacity. The reductions in prices since control was abolished, were of course right, but the continent is still able to compete, though deliveries from that side are much prolonged.

Among some recent contracts of interest is one for water turbines and an electrical plant for India, which has been secured by Messrs. Vickers & Co. Sir William Arrol & Co., Glasgow, have been awarded a large part of the contract for the construction of a new dry dock at Sunderland. The dock is to be 500 ft. long and 75 ft. broad, and will be considerably larger than any existing dry dock on the river Weir.

Some of the leading shipping companies of Germany have been making definite offers for some of the German liners, which were handed over to this country under the peace treaty terms, and were bought by British companies from the reparations commission. It is stated that these vessels are required for services between Germany and the United States. The prices which the German buyers are offering are considerably above those which the British companies pay. So far, however, all offers have been rejected.

A Walworth warehouse is being erected on Jackson Avenue, Long Island City, New York, for the Walworth Mfg. Co., Boston, by Dwight P. Robinson & Co., New York. The plant will include a three-story and basement concrete building capable of receiving three floors later on, a garage to accommodate eight trucks, a pipe storage building and a pipe shop extension at the rear of the main building, besides the necessary retaining walls, platforms, railroad sidings and the like. The pipe storage building is to be 60 x 214 ft., served with a crane running out over the railroad siding.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Plates

Sheared, tank quality, base, per lb. 2.00c. to 2.25c.

Structural Material

Beams, channels, etc. 2.00c. to 2.25c.

Iron and Steel Bars

Soft steel bars, base, per lb. 1.90c. to 2c.

Refined iron bars, base, per lb. 2.50c.

Hot-Rolled Flats

Hoops, base, per lb. 2.75c. to 3c.

Bands, base, per lb. 2.75c. to 3c.

Strips, base, per lb. 2.75c. to 3c.

Cotton ties, per bundle of 45 lb. \$1.12

Cold-Finished Steels

Bars and shafting, base, per lb. 2.50c.

Strips, base, per lb. 4.25c. to 4.50c.

Wire Products

Nails, base, per keg. \$2.60 to \$2.75

Bright plain wire, base, per 100 lb. 2.35 to 2.50

Annealed fence wire, base, per 100 lb. 2.35 to 2.50

Galvanized wire, base, per 100 lb. 2.85 to 3.00

Galvanized barbed, base, per 100 lb. 3.15 to 3.40

Galvanized staples, base, per keg. 3.15 to 3.40

Painted barbed wire, base, per 100 lb. 2.65 to 2.90

Polished staples, base, per keg. 2.65 to 2.90

Cement coated nails, base, per count keg. 2.10c. to 2.35c.

Woven fence, carloads (to jobbers) .70 1/2 to 72 per cent off list

Woven fence, carloads (to retailers) .68 to 69 1/2 per cent off list

Bolts and Nuts

Machine bolts, small, rolled threads, 60 and 10 per cent off list

Machine bolts, small, cut threads, 50, 10 and 10 per cent off list

Machine bolts, larger and longer, 50, 10 and 10 per cent off list

Carriage bolts, 3/4 x 6 in.:

Smaller and shorter, rolled threads,

50, 10 and 10 per cent off list

Cut threads 50 and 10 per cent off list

Longer and larger sizes. 50 and 10 per cent off list

Lag bolts 60 and 10 per cent off list

Plow bolts, Nos. 1, 2 and 3 heads. 50 and 10 per cent off list

Other style heads. 20 per cent extra

Machine bolts, c.p.c. and t. nuts, 3/4 x 4 in.:

Smaller and shorter. 45 and 10 per cent off list

Larger and longer sizes. 45 and 10 per cent off list

Hot pressed square or hex. blank nuts. \$3.75 off list

Hot pressed nuts, tapped. 3.75 off list

C.p.c. and t. sq. or hex. nuts, blank. 3.75 off list

C.p.c. and t. sq. or hex. nuts, tapped. 3.75 off list

Semi-finished hex. nuts:

9/16 in. and smaller, U. S. S. 80 per cent off list

3/4 in. and larger, U. S. S. 75 per cent off list

Small sizes, S. A. E. 80 and 10 per cent off list

S. A. E., 3/4 in. and larger. 75 and 10 per cent off list

Stove bolts in packages. 80 and 5 per cent off list

Stove bolts in bulk. 80, 5 and 2 1/2 per cent off list

Tire bolts 50, 10 and 10 per cent off list

Cap and Set Screws

Milled square and hex. head cap screws. 75 per cent off list

Upset cap screws. 75 per cent off list

Upset set screws. 75 and 10 per cent off list

Upset set screws. 80 per cent off list

Rivets

Large structural and ship rivets, base, per 100 lb. \$3.00

Large boiler rivets, base, per 100 lb. 3.10

Small rivets 65 to 65 and 5 per cent off list

Track Equipment

Spikes, 9/16 in. and larger, base, per 100 lb. \$2.75 to \$2.85

Spikes, 1/2 in. and smaller, base, per 100 lb. 3.00 to 3.50

Spikes, boat and barge, base, per 100 lb. 3.00 to 3.50

Track bolts, base, per 100 lb. 3.75 to 4.50

Tie plates, per 100 lb. 2.25

Angle bars, base, per 100 lb. 2.40

Welded Pipe

Butt Weld

Inches	Steel	Black	Galv.	Inches	Iron	Black	Galv.
1/4	51 1/2	26		1/4 to 3/4	7	+33	
1/2	57	31 1/2		1/2	26	8	
3/4	62	48 1/2		3/4	32	17	
1	66	54 1/2		1 to 1 1/2	34	19	
1 to 3	68	56 1/2					

Lap Weld

2	61	49 1/2	2	29	15
2 1/2 to 6	65	53 1/2	2 1/2 to 6	32 1/2	19
7 to 8	62	49 1/2	7 to 12	30	17
9 to 12	61	48 1/2			

Butt Weld, extra strong, plain ends

1/4	47 1/2	31	1/4 to 3/4	+15	+45
1/2 to 3/4	53	36 1/2	1/2 to 3/4	25	13
3/4	59	48 1/2	3/4	32	18
1 to 1 1/2	64	53 1/2	1 to 1 1/2	34	20
1 to 1 1/2	66	55 1/2			
2 to 3	67	56 1/2			

Lap Weld extra strong, plain ends

2	59	48 1/2	2	30	17
2 1/2 to 4	63	52 1/2	2 1/2 to 4	33	21
4 1/2 to 6	62	51 1/2	4 1/2 to 6	32	20
7 to 8	58	45 1/2	7 to 8	25	13
9 to 12	52	39 1/2	9 to 12	20	8

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 and 2 1/2 per cent.

Boiler Tubes

Lap Welded Steel

1 1/4 in.	23 1/2
2 to 2 1/4 in.	39
2 1/2 to 3 in.	49
3 1/4 to 13 in.	54

Charcoal Iron

1 1/4 in.	+ 2
1 1/2 to 1 3/4 in.	8
2 to 2 1/4 in.	18
2 1/2 to 3 in.	23
3 1/4 to 4 1/2 in.	25

To large buyers of steel tubes a supplementary discount of 5 per cent is allowed.

Standard Commercial Seamless Boiler Tubes

Discounts on cold-drawn tubes in carload lots, f.o.b. Pittsburgh, follow:

1 in.	57	2 1/2 and 2 3/4 in.	40
1 1/4 and 1 1/2 in.	49	3 in.	44
1 3/4 in.	33	3 1/2 to 4 in.	49
2 and 2 1/4 in.	36	4 1/2 in. and 5 in.	41

Hot Rolled

3 in. 46 | 3 3/4 to 4 in. 51

Less carloads, 4 points less. Add \$8 per net ton for more than four gages heavier than standard. No extras for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be sold at mechanical tube list and discount. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Carbon under 0.30, base, 85 per cent off list. Carbon 0.30 to 0.40, base, 83 per cent off list. Plus usual differentials and extras for cutting.

Seamless Locomotive and Superheater Tubes

Cents per Ft.	Cents per Ft.
2-in. O.D. 12 gage. 13	2 1/4-in. O.D. 10 gage. 17 1/2
2-in. O.D. 11 gage. 14	3-in. O.D. 7 gage. 33
2-in. O.D. 10 gage. 15	1 1/2-in. O.D. 9 gage. 13
2 1/4-in. O.D. 12 gage. 15	5/8-in. O.D. 9 gage. 51
2 1/4-in. O.D. 11 gage. 16	5/8-in. O.D. 9 gage. 53

Tin Plate

Standard cokes, per base box. \$4.75

Terne Plate

(Per package, 200-lb.)

8-lb. coating \$9.30	25-lb. coating I. C. \$14.25
8-lb. coating I. C. 9.60	30-lb. coating I. C. 15.25
15-lb. coating I. C. 11.80	35-lb. coating I. C. 16.25
20-lb. coating I. C. 13.00	40-lb. coating I. C. 17.25

Sheets

Blue Annealed

Nos. 9 and 10 (base), per lb. 2.50c. to 2.75c.

Box Annealed, One Pass Cold Rolled

No. 28 (base), per lb. 3.35c. to 3.75c.

Galvanized

No. 28 (base), per lb. 4.35c. to 4.75c.

Tin-Mill Black Plate

No. 28 (base), per lb. 3.35c. to 3.50c.

Manufacturers have pamphlets, which can be had upon application, giving price differentials for gage and extras for length, width, shearing, etc.

Freight Rates

All rail freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic. \$0.325	Buffalo \$0.265	St. Louis \$0.43	Pacific Coast \$1.50
Philadelphia, export. 0.235	Cleveland 0.215	Kansas City 0.735	Pac. Coast, ship plates 1.20
Baltimore, domestic. 0.315	Cleveland, Youngstown 0.19	Kansas City (pipe) 0.705	Birmingham 0.69
Baltimore, export. 0.225	Comb. 0.295	St. Paul 0.595	Memphis 0.385
New York, domestic. 0.34	Detroit 0.295	Omaha 0.735	Jacksonville, all rail. 0.50
New York, export. 0.255	Cincinnati 0.295	Omaha (pipe) 0.705	Jacksonville, rail and water 0.415
Boston, domestic 0.365	Indianapolis 0.31	Denver 1.275	New Orleans 0.515
Boston, export 0.255	Chicago 0.34	Denver (pipe) 1.215	

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 48,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 30c. to 40c.; ship plates, 30c. to 40c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 30c. to 40c.; sheets and tin plates, 50c.; rods, wire rope, cable and strands, 75c.; wire fencing, netting and stretcher, 50c.; pipe, not over 8 in. in diameter, 50c.; over 8 in. in diameter, 2 1/2c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

AUGUST IN FABRICATED STEEL

Bureau of Census Has Figures for Five Months from 125 Firms

WASHINGTON, Sept. 19.—Sales of fabricated structural steel in August showed a slight increase over the figure reached in July, according to the Bureau of Census. August sales amounted to 65.2 per cent of shop capacity, compared with 62 per cent in July and 72 per cent in June.

Reports have been received from 125 firms for each of the five months April to August, inclusive. Those 125 firms report a total shop capacity of 208,245 tons per month. The actual sales for the past five months reported by those 125 identical firms have been as follows:

1922	Tonnage Booked	Per Cent of Capacity*
April	181,947	87.4
May	165,272	79.4
June	149,907	72.0
July	129,160	62.0
August	135,843	65.2

*The inclusion of additional firms this month has made slight revisions in the per cent of capacity reported previously.

FABRICATED STEEL BUSINESS

Drop in Volume of New Inquiry But Numerous Awards

Among the fabricated steel awards of the past week are the following:

National Theater, Richmond, Va., 350 tons, to the Richmond Structural Steel Co.

Power house for New York State at Crescent, N. Y., 300 tons, to the American Bridge Co.

Walker Hotel, Washington, 4000 tons, to the American Bridge Co.

Two wings, American Museum of Natural History, New York, 1600 tons, to American Bridge Co.

Addition to the Girard Trust Co. building, Philadelphia, 1200 tons, to the Phoenix Bridge Co.

Five bridges, Pennsylvania Railroad, 1000 tons, to the Phoenix Bridge Co.

Ballinger Building, Philadelphia, 1300 tons, to the Shoemaker-Satterthwait Bridge Co.

Magnetic Pigment Co., Trenton, N. J., 200 tons, to the American Bridge Co.

Horn & Hardart, Philadelphia, 230 tons, to McClintic-Marshall Co.

Apartment hotel, 299 Park Avenue, New York, 4000 to 5000 tons, reported awarded to the New York Ship Building Corporation, may be awarded, it is now stated, to Post & McCord.

School and church, Knickerbocker Avenue, Brooklyn, 350 tons, to A. E. Norton, Inc.

Apartment, East Eighty-sixth Street, New York, 1000 tons, to the Hinkle Iron Co.

Union Pacific system, single track through riveted spans for bridge over Columbia River, east of Hedges, Ore., 2735 tons, to American Bridge Co.

Chicago, Burlington & Quincy, bridge work, 1056 tons, to American Bridge Co.

Foundry building, Seattle, for Washington Iron Works, 611 tons, to the Austin Co., Cleveland.

Two single-track through plate girder spans for Missouri Pacific, 275 tons, to American Bridge Co.

Power house for Santa Fe at San Bernardino, Cal., 246 tons, to American Bridge Co.

Steel for housing machinery, Missouri Portland Cement Co., Prospect Hill, St. Louis County, Mo., 230 tons, to American Bridge Co.

Draw span over Nehalem River for Tillamook County, Ore., 188 tons, to Pacific Iron Works.

Tractor works, wheel shop building, International Harvester Co., Chicago, 170 tons, to unnamed fabricator.

Extension to Commonwealth Steel Co., Granite City, Ill., 163 tons, to Stupp Brothers.

Through plate girder span, Spadra, Ark., for Missouri Pacific, 135 tons, to American Bridge Co.

Buildings for Sanitary District, Chicago, 104 tons, to unnamed fabricator.

Morris & Co., Stockyards Building, Chicago, 200 tons, to A. Bolters Sons.

Eagles' clubhouse, Davenport, Iowa, 100 tons, to Davenport Machine & Foundry Co.

Auditorium, Washington, 1100 tons, to Lehigh Structural Steel Co.

Skelton Shovel Co., Dunkirk, N. Y., 150 tons, to Kellogg Structural Steel Co., Buffalo.

Odd Fellows' new building at Silver Creek, N. Y., 150 tons, to Kellogg Structural Steel Co.

National Life & Accident Assurance Co. office building, Nashville, Tenn., 500 tons, to International Steel & Iron Co. Highway bridge, Clarksville, Tenn., 540 tons, to Nashville Bridge Co.

Highway bridge, Montgomery County, Ohio, 600 tons, to Brookville Bridge Co.

Chapel at Denison University, Granville, Ohio, 125 tons, to Mott Iron Works.

High school, Somerville, Mass., 150 tons, to the New England Structural Co., Boston.

High school, Medford, Mass., 150 tons, to the New England Structural Co.

Westinghouse Lamp Co., Bloomfield, N. J., 150 tons, to the Phoenix Bridge Co.

Power station, Bennings, D. C., 100 tons, to the New York Shipbuilding Co.

Structural Projects Pending

Inquiries for structural steel work now being figured on include the following:

Edison Co. power station, South Boston, 950 tons.

Highway bridge, Lowell, Mass., 235 tons.

Exchange National Bank, Tampa, Fla., 140 tons.

Eighteen-story addition to First National Bank Building, Chicago, 400 tons.

State Library, Lawrence, Kan., 500 tons, bids received and project postponed.

Consumers Power Co., Jackson, Mich., heating plant at Grand Rapids, 115 tons.

Indiana Quarries Co., Bedford, Ind., new plant, 600 tons, bids in.

J. A. Fay & Egan Co., new plant, Cincinnati, 900 tons, bids in.

Hotel at Bridgeton, N. J., 300 tons; general contract let to F. V. Moore, Philadelphia.

Addition to Corn Exchange Bank, Philadelphia, 300 tons; bids close Sept. 27.

Plant for the Toledo Libby-Owens Sheet Glass Co., Toledo, 5000 tons.

Baseball grandstand, Buffalo, tonnage unnamed.

Cuyahoga County grade crossing elimination, Cleveland, 500 tons.

RAILROAD EQUIPMENT BUYING

Activity in Locomotives Continues Conspicuous With Some Fresh Car Inquiries

Buying of locomotives is noteworthy, although inquiries of railroad cars and car parts continue in fair volume. Some of the notable items are as follows:

New York Central, 90 locomotives, placed with American Locomotive Co.

Baltimore & Ohio, 50 Mikado type locomotives, awarded to Baldwin Locomotive Works.

Erie Railroad, 30 additional Mikado type locomotives, placed with Baldwin Locomotive Works.

Nashville, Chattanooga & St. Louis, 7 locomotives, placed with Baldwin Locomotive Works.

The Santa Fe expects to enter the market for 100 locomotives and the Rock Island and the Burlington for about 50 each. The Duluth & Iron Range is inquiring for 8 Mikado type engines.

The Western Maryland is inquiring for 10 consolidation type engines.

The Chesapeake & Ohio is in the market for 50 Mallet type locomotives.

The Norfolk & Western has placed 12 Mallet type engines with Baldwin Locomotive Works.

Fruit Growers Express Co., 1000 underframes under inquiry.

Baltimore & Ohio, in the market for 30 baggage cars.

Chicago & Northwestern, in market for 800 50-ton gondolas and 200 55-ton flat cars.

Norfolk Southern, inquiring for 240 steel center constructions.

Champlin Refining Co., Enid, Okla., ordered 500 tank cars of Pennsylvania Tank Car Co., Sharon, Pa.

The Chicago & Eastern Illinois has placed 17 baggage cars with the Pullman Co.

The Illinois Central has placed 75 caboose cars with the American Car & Foundry Co.

The Pittsburgh Street Railways Co. is inquiring for 100 street cars.

NON-FERROUS METALS

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Straits Tin		Lead		Zinc	
	Lake	Electrolytic*	New York	New York	St. Louis	New York	St. Louis	
Sept. 13.....	14.12½	13.75	32.20	6.05	5.70	6.75	6.40	
14.....	14.12½	13.75	32.12½	6.10	5.75	6.80	6.45	
15.....	14.12½	13.75	32.12½	6.12½	5.80	6.85	6.50	
16.....	14.12½	13.75	32.12½	6.12½	5.80	6.90	6.55	
18.....	14.12½	13.75	32.12½	6.12½	5.80	6.95	6.60	
19.....	14.12½	13.75	32.12½	6.25	5.90	7.00	6.65	

*Refinery quotation.

New York

NEW YORK, Sept. 19.

The most inactive and duldest of the markets is tin, but the rest show different degrees of activity and strength. The copper market is moderately active and strong. Pronounced activity and advancing prices characterize both the lead and zinc markets. The antimony market is also strong.

Copper.—Producers and selling agencies report a good business in copper almost daily but prices have not increased though they have become firmer and the absence of any cheaper lots is pronounced. There is also a very good demand for export. Electrolytic copper is firm at 14c., delivered, or 13.75c., refinery, for the balance of the year. Not much interference with deliveries is reported because of railroad transportation conditions.

Tin.—On only two days in the past eight has there been any activity in the Straits tin market. The principal feature of the market has been that there were sellers at 32.12½c. and buyers at 32c. with difficulty as to an agreement as to a sale price. The fairly liberal sales referred to in this paragraph a week ago, as having been made Sept. 12, amounted to about 500 to 600 tons of Straits tin. On Sept. 13 there was also some business amounting to 250 to 300 tons. On other days the conditions referred to prevailed because of the relative attitude of sellers and buyers. It has been believed in the market that when the price reached 32c. there would be a rush to buy but this was only partly realized on Sept. 12. The market today has been moderately active with the quotation at 32.12½c., New York, for spot Straits. The London market today was approximately the same as a week ago at £158 15s for spot Standard, £159 17s 6d for future Standard and £159 per ton for spot Straits. Arrivals thus far of this month have been 3350 tons. The quantity afloat is reported as 7728 tons.

Lead.—A heavy demand resulting in a very strong market has characterized the week. The American Smelting & Refining Co. advanced its prices on Sept. 14, 10 points to 5.80c., St. Louis, or 6c., New York, and again today to 5.90c., St. Louis, or 6.10c., New York, but the outside market has advanced almost daily until today the sales have been made up to 5.90c., St. Louis, or 6.25c., New York. Practically all sellers have disposed of their September production and in some cases their October output has been heavily sold. Undoubtedly a scarcity of the metal is likely to develop.

Zinc.—The advancing tendency of the market noted a week ago has gone on rapidly until prime Western for early delivery is difficult to obtain. Sales were made today at 6.65c. to 6.70c., St. Louis, or 7c. to 7.05c., New York, the advance having been progressive practically every day since a week ago. The increase in quotation for the week represents about 30 points. The metal is selling higher than at any time in 1921 or since. Difficulty in obtaining ore as well as labor, together with coal and transportation hindrances, are the controlling causes, accentuated of course by an increased demand from consumers. Producers have sold practically all

of their September output and some of their October, as in the case of lead.

Antimony.—Wholesale lots of Chinese metal for early delivery are quoted at 6.75c. per lb., New York, duty paid.

Aluminum.—The leading producer continues to quote wholesale lots of virgin metal, 98 to 99 per cent pure, for early delivery at 19.10c. per lb., f.o.b. plant, with the same grade offered by importers and produced in various foreign countries at 17.75c. to 18c. per lb., duty paid, New York.

Old Metals.—The market continues strong, but business appears to be marking time. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible.....	13.50
Copper, heavy and wire.....	12.75
Copper, light and bottoms.....	11.25
Heavy machine composition.....	10.50
Brass, heavy.....	8.25
Brass, light.....	6.50
No. 1 red brass or composition turnings.....	9.00
No. 1 yellow rod brass turnings.....	7.50
Lead, heavy.....	5.00
Lead, tea.....	4.00
Zinc.....	4.00

Chicago

Sept. 19.—Lead, zinc and antimony have advanced in a quiet market. The strength in lead and zinc is attributed to the long idleness of numerous smelters. The old metals remain unchanged. We quote, in carload lots, lake copper, 14.25c.; tin, 33.50c. to 34c.; lead, 5.95c.; spelter, 6.70c.; antimony, 8.50c., in less than carload lots. On old metals we quote copper wire, crucible shapes and copper clips, 11c.; copper bottoms, 9.25c.; red brass, 8.75c.; yellow brass, 6.75c.; lead pipe, 4.50c.; zinc, 3.75c.; pewter, No. 1, 20c.; tin foil, 22.50c.; block tin, 26c., all buying prices for less than carload lots.

St. Louis

Sept. 19.—The lead market was strong during the week at an advance of 15 points, while slab zinc was firm and 25 points higher. We quote carlots: Lead, 5.80c.; slab zinc, 6.50c. On old metals we quote: light brass, 3.50c.; heavy red brass and light copper, 7c.; heavy yellow brass, 4c.; heavy copper and copper wire, 7.50c.; zinc, 2c.; pewter, 15c.; tin foil, 16c.; tea lead, 2c.; aluminum, 9c.

Effects of Railroad Congestion in the Youngstown District

YOUNGSTOWN, Sept. 19.—Congestion at shipping platforms of sheet rolling plants because of car shortage may force curtailment of production, as rollers are disinclined to accumulate large stocks of the finished product against possible decline in buying.

President James A. Campbell of the Youngstown Sheet & Tube Co. believes railroads will be able to deliver coal in sufficient quantities to maintain independent production in this territory at 70 per cent. The company will not re-light its two Hubbard blast furnaces until after the close of navigation. Mr. Campbell looks for continued interruption to shipping through the winter because of inadequate condition of locomotive equipment.

The A. M. Byers Co. has arranged to secure Connelville beehive coke for its Girard stack scheduled to be blown in this week. The Republic Iron & Steel Co. is preparing its Hannah furnace at Youngstown and the fifth stack in its Hazleton group for re-lighting.

The Atlas Steel Corporation will be the name of the new company to be formed by the merger of the Electric Alloy Steel Co., Youngstown, Ohio, and the Atlas Crucible Steel Co., Dunkirk, N. Y., producers of high-speed and special analysis steels. Gross capital assets of the two constituents are about \$12,000,000. Until completion of the merger the companies are operating under unified management, with L. J. Campbell, president of the Electric Alloy company, as chairman of the board and chief executive officer, located at Dunkirk.

Philadelphia Iron and Steel Market

(Continued from page 750D)

Pennsylvania steel company; 2000 tons of basic to a New England wire company at about the same price; 5000 tons of gray forge iron to a maker of bar iron at well above \$30, furnace, this iron, however, being of special quality, and 1000 tons of No. 2X to an electrical machinery manufacturer at \$33, furnace. A Virginia cast iron pipe manufacturer is reported to have placed an order for a substantial tonnage with a Virginia furnace which will be blown in shortly. The Midvale Steel & Ordnance Co. will blow in a second furnace at Coatesville on Oct. 1, which will operate for at least two weeks on foundry iron, which is being offered for sale, and the same company now has five stacks in blast at its Johnstown plant and a sixth will be blown in next Sunday. Foundry iron is also being offered for shipment from Johnstown. The Alan Wood Iron & Steel Co. is having its No. 3 furnace relined and as soon as this work is completed it will be blown in. Prospects of regular merchant furnaces becoming active are not bright under present conditions in the coke market.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 76 cents to \$1.64 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	\$33.26 to \$35.64
East. Pa. No. 2X, 2.25 to 2.75.....	34.26 to 36.64
East. Pa. No. 1X.....	35.26 to 37.64
Virginia No. 2 plain, 1.75 to 2.25 sil.	37.17
Virginia No. 2X, 2.25 to 2.75 sil.	38.17
Basic delivered eastern Pa.....	31.00 to 33.00
Gray forge	31.00 to 33.00
Malleable	35.00 to 36.00
Standard low phos. (f.o.b. furnace)...	38.00 to 40.00
Copper bearing low phos. (f.o.b. furnace)	37.00 to 38.00

Ferroalloys.—Car load lots of resale ferromanganese have been sold at \$85 and \$90, seaboard. For forward delivery importers of British ferromanganese continue to offer at \$67.50, seaboard, the buyer to pay the new duty. The New Jersey Zinc Co. is keeping its furnace in blast on spiegeleisen, having obtained coke from abroad, and is offering the 16 to 19 per cent grade at \$38 and the 19 to 21 per cent grade at \$39, furnace.

Semi-Finished Steel.—Prices quoted for semi-finished steel are firm. Rerolling billets can not be obtained for less than \$40, Pittsburgh, nor forgings billets for less than \$45, while on some lots higher prices have been paid. A sale of 1000 tons of forging billets at \$47.50, Pittsburgh, is reported. The American Locomotive Co. is in the market for about 5000 tons of forging billets of special quality.

Rails.—Nearly all of the Eastern railroads are figuring on their 1923 rail requirements, and although formal inquiries have not been issued in all cases, it is expected that the Pennsylvania will require about 200,000 tons, the Philadelphia & Reading, 13,000 tons, the Norfolk & Western, 25,000 tons. The Baltimore & Ohio will also buy, but its tonnage has not been named. Eastern companies which roll rails have quoted on 200,000 tons for the New York Central. Light rails are in good demand at 2.25c., Pittsburgh.

Plates.—Locomotive buying is responsible for most of the important plate demand. About 4000 tons has been placed by the Baldwin Locomotive Works for the 100 engines recently ordered by the Pennsylvania Railroad; about 2000 tons for 50 ordered by the Baltimore & Ohio; about 1000 tons will be required for 30 additional locomotives ordered by the Erie; the Norfolk & Western has contracted for 12, and the Nashville, Chattanooga & St. Louis for 7. The Chesapeake & Ohio is inquiring for 50. Otherwise plate orders are in small volume, and mills which are quoting 2.25c. to 2.50c., Pittsburgh, are not finding it easy to book orders except in very small lots. The minimum on plates appears to be 2.10c., Pittsburgh, quoted by only one mill, but some others have named 2.15c. and 2.20c. on desirable lots. Plate production at Eastern mills is increasing. The Midvale plant at Coatesville will this month turn out about 15,000 tons, which is slightly more than 50 per cent of capacity. We quote sheared plates at 2.10c. to 2.50c., Pittsburgh.

Structural Steel.—Prices on fabricated steel work are working lower. An office building in Philadelphia, for which contract has been let, went at \$81, erected, which was about \$10 per ton below the next lowest price. Several structural jobs in the Philadelphia district which have been let are reported in another column. Plain material is quoted from 2.10c. to 2.25c., Pittsburgh.

Bars.—Steel bars are selling from 2c. to 2.25c., Pittsburgh, but it is becoming more difficult for the mills quoting 2.25c. to get that price and some concessions of \$2 or \$3 a ton have been made. Business is in moderate volume. One mill is quoting bar iron at 2.15c., Pittsburgh, but others in the East ask 2.25c. for carload lots.

Sheets.—The new level of prices on sheets is 2.75c. for blue annealed, 3.75c. for black and 4.75c. for galvanized, all base Pittsburgh, with lighter gages of galvanized having been quoted as high as 4.90c. Many consumers are covered at the former prices, but some business has been done for early shipment at the higher level.

Warehouse Business.—Local jobbers have advanced cold rolled steel \$5 a ton. Other prices are unchanged. We quote for local delivery as follows:

Soft steel bars and small shapes, 2.90c.; iron bars (except bands), 2.90c.; round edge iron, 3.10c.; round edge steel, iron finish, $1\frac{1}{2} \times \frac{1}{2}$ in., 3.10c.; round edge steel planished, 3.85c.; tank steel plates, $\frac{1}{4}$ -in. and heavier, 3c.; tank steel plates, $\frac{3}{16}$ -in., 3.20c.; blue annealed steel sheets, No. 10 gage, 3.85c.; black sheets, No. 28 gage, 4.60c.; galvanized sheets, No. 28 gage, 5.75c.; square twisted and deformed steel bars, 3c.; structural shapes, 3c.; diamond pattern plates, $\frac{1}{4}$ -in., 4.80c.; $\frac{3}{16}$ -in., 5c.; spring steel, 4.25c.; round cold-rolled steel, 3.85c.; squares and hexagons, cold-rolled steel, 4.35c.; steel hoops, No. 13 gage and lighter, 4.10c.; steel bands, No. 12 gage to $\frac{3}{16}$ -in., inclusive, 3.70c.; rails, 2.90c.; tool steel, 8.50c.; Norway iron, 5.50c.

Coke.—Much to the surprise of those who had expected that coke prices would continue to show declines because of better coal supply, the market has stiffened within the past few days, due, it is stated, to inadequate car supply rather than to lack of coke. Whereas a week ago furnace coke was offered at \$10, Connellsville, it now is quoted at not less than \$11, and foundry coke is also \$1 a ton higher at a minimum of \$13, Connellsville. By-product coke is offered at \$13.50 to \$14, Swedeland, Pa.

Old Material.—There have been advances on nearly all grades of scrap from 50c. to \$3 or more a ton on top of similar advances which were recorded a week ago. A strong demand, coupled with rising prices, has created an excited market. Brokers are freely offering \$21, Pittsburgh, for No. 1 heavy melting steel and \$18, delivered at eastern Pennsylvania steel works. The Alan Wood Iron & Steel Co. bought 10,000 tons at this price, and the market advanced so rapidly that the sellers, it is reported, were unable to cover fully at a profit. Our quotation on low phosphorus scrap has been advanced \$3.50 a ton, based on a sale of 1000 tons of plate croppings at about \$25.50, delivered, while an Eastern mill has quoted \$26, f.o.b. mill, on a tonnage of billet crop ends.

We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel.....	\$18.00 to \$18.50
Scrap rails	18.00 to 18.50
Steel rails for rolling.....	21.00 to 22.00
No. 1 low phos. heavy 0.04 and under	25.50 to 26.00
Cast iron car wheels.....	23.00 to 24.00
No. 1 railroad wrought.....	22.00 to 23.00
No. 1 yard wrought.....	20.00 to 21.00
No. 1 forge fire.....	16.00 to 16.50
Bundled sheets (for steel works)...	15.50 to 16.00
No. 1 busheling.....	14.50 to 15.50
Turnings (short shoveling grade for blast furnace use).....	14.00 to 15.00
Mixed borings and turnings (for blast furnace use)	14.00 to 15.00
Machine-shop turnings (for steel works use)	16.00 to 16.50
Machine-shop turnings (for rolling mill use)	17.00 to 17.50
Heavy axle turnings (or equivalent)	17.00 to 17.50
Cast borings (for steel works and rolling mills)	16.50 to 17.50
Cast borings (for chemical plants)...	23.00 to 25.00
No. 1 cast.....	23.00 to 24.00
Heavy breakable cast (for steel plants)	21.00 to 22.00
Railroad grate bars.....	16.00 to 16.50
Stove plate (for steel plant use)...	16.00 to 16.50
Railroad malleable	15.50 to 16.50
Wrought iron and soft steel pipes and tubes (new specifications).....	16.50 to 17.00
Shafting	23.00 to 24.00
Steel axles	28.00 to 30.00

PERSONAL

J. G. Carruthers, manager of sales, Chicago district, Illinois Steel Co. and special sales agent Carnegie Steel Co., with headquarters at Chicago, has resigned to be-



J. G. CARRUTHERS

come general sales manager of the Otis Steel Co., Cleveland. Mr. Carruthers was born at Covington, Ky., Feb. 9, 1878. His first connection with the steel industry was with the Columbus Bridge Co., Columbus, Ohio, of which he was secretary. From Columbus he went to Cincinnati, where he was assistant manager of sales Cambria Steel Co. In 1908 he was appointed manager of sales the Cincinnati district office Carnegie Steel Co., remaining in that position until 1919, when he went to Chicago to take the office he is now leaving. He succeeds D. W. Glanzer, resigned, who has been associated with the sales department of Otis Steel Co. for over 20 years.

David T. Buffington, of the structural and plate bureau, general sales department, Illinois Steel Co., has been appointed manager of sales, Chicago district, for that company and special sales agent of Carnegie Steel Co., with offices at Chicago, succeeding J. G. Carruthers, resigned.

Gustavus Pratt has been in the employ of the Stanley Works, New Britain, Conn., for 60 years. Mr. Pratt's father was employed in the same company for 65 years, the combined service being 125 years. In these times of unusual labor turnover, this record of long and efficient service is noteworthy.

H. T. Burrows, Appleton, Wis., has been elected secretary Malleable Iron Range Co., Beaver Dam, Wis., to fill the vacancy caused by the death of A. S. Bowron. Mr. Burrows for some time has been associated with the Fox River Valley Paper Co., Appleton.

George R. Fink has resigned as general sales manager West Penn Steel Co., Brackenridge, Pa., to become affiliated with a new company which will build a sheet plant in Detroit.

J. Fred Townsend, traffic manager National Tube Co., Pittsburgh, has been elected vice-president of the Lake Terminal Railroad, the McKeesport Connecting Railroad and the Benwood & Wheeling Connecting Railroad, rail subsidiaries of the National Tube Co.

Harry J. Foss has been elected president of the Berkshire Mill Supply Co., Pittsfield, Mass., filling the vacancy caused by the recent death of Charles E. Hibbard.

Louis H. Egan, president Union Electric Light & Power Co., St. Louis, has been elected president of the Union Colliery Co., a subsidiary of the electric company, to succeed Eugene McAuliffe, resigned. Frank J. Boehm, vice-president and L. E. Young, manager of the steam heating department of the electric company, have been made vice-president and general manager respectively of the colliery company.



GUSTAVUS PRATT

R. A. DeVlieg has resigned his position as chief engineer and factory manager of the Handley-Knight Co., Kalamazoo, Mich., to become tool engineer of the Maxwell Motor Corporation, Detroit.

W. S. Rugg, assistant to vice-president, Westinghouse Electric & Mfg. Co., has been appointed to the newly created position of general manager of sales of that company.

E. K. Morgan, general superintendent Rockford Drilling Machine Co., has resigned his position to assist in supervising the design of special machinery for the Ingersoll Milling Machine Co., also of Rockford, Ill. He retains his financial interest in the Rockford Drilling Machine Co., and is still a member of its board of directors.

OBITUARY

Death of H. H. Campbell

HARRY HUSE CAMPBELL, for years superintendent and general manager of the Pennsylvania Steel Co. at Steelton, Pa., died last week at the age of 63. Following his graduation from Massachusetts Institute of Technology, he took up work at Steelton in a minor capacity, and for practically all his career in steel making he was identified with that plant. As metallurgical engineer he was connected also with the kindred companies, the Maryland Steel Co. and the Spanish-American Iron Co. Mr. Campbell's most important investigations were into the principles and practice of the open-hearth steel process, these being embodied in his well-known work, "The Manufacture and Properties of Steel." For the past twelve years, due to serious illness, he has lived in retirement. More extended reference to Mr. Campbell's work will be made in a subsequent issue.



H. H. CAMPBELL

FRANK ADAM, chairman of the board, Frank Adam Electric Co., pioneer manufacturer of electrical goods in St. Louis, died there recently. Mr. Adam came from Germany to the United States in 1853 and went to St. Louis in 1865. He entered the electrical business in 1890.

THOMAS BEADLING, SR., president, North East Coal Mining Co., and treasurer, Colonial Coal & Coke Co., died at his home in Crafton, Pa., Sept. 13. He was an active figure in the coal and coke business in Pittsburgh for many years.

Steel Mill Equipment Orders Placed

The Otis Steel Co., Cleveland, has placed orders for the following additional equipment for its new steel plant: Hot strip mill to the United Engineering & Foundry Co.; 10 cold rolls with the Mesta Machine Co.; five with the Philadelphia Roll & Machine Co. and with the Farrel Foundry & Machine Co.; six strip mill cranes with the Morgan Engineering Co. and a 10,000 kw. turbo-generator and blooming mill and sheet bar mill motors with the General Electric Co.

Evening and Saturday afternoon courses in engineering, beginning Monday evening, Oct. 2, are announced by New York University (engineering section, extramural division, University Heights), New York. The bulletin gives information as to the courses, requirements of admission and tuition costs.

Features of Modern Blast Furnace Practice (Concluded from page 734)

was not over 550 it was not possible to file them. He mentioned these examples in relation to the method of using Brinell as some indication of the successful hardening properties of high speed steel. These statements were rather startling, and he would suggest that quite a number of the members of the institute would like to have small samples of these materials which could be easily filed at Brinell number 650, but which could not be filed at Brinell number 550.

V. STOBIE, Durham, also referred to the point Mr. Brearley had mentioned about not making commercial high-speed steel from turnings. One could not go on getting high-speed steel from scrap, and must start to make something from raw materials. He had had a lot of experience in this direction and had made ten-ton charges of high-speed steel from turnings and had not found the difficulties mentioned in the paper, nor did he find anything like the losses Mr. Ogilvie mentioned. The paper told them that they must expect anything between ten and twenty per cent loss on turnings, if they were going to make high speed steel, but he did not think that the average would be anything like that. It would rather look as though Mr. Ogilvie had not had the best metallurgical conditions in his furnace. That seemed to be proved when he said that if he used high-speed scrap most of the vanadium would have been removed. That was totally unnecessary nowadays. He had plenty of instances where they had melted scrap containing 1 per cent of vanadium and 0.8 was easily left in the bath. When told that it was impossible to use turnings in this country and make the thing commercially practicable one must ask what the experience was on which such an opinion had been founded. He would rather suggest that Mr. Ogilvie see what could be done elsewhere before he turned down as uncommercial the method which alone could give them new material.

Flow of Steels

J. H. S. DICKENSON, Sheffield, presented a paper on the flow of steels at a low red heat, giving details of recent developments in the manufacture of metallic containers capable of withstanding considerable stress at elevated temperatures for long periods. It was found that the nickel-chromium alloy selected for synthetic ammonia producers was better able to resist occasional and intermittent heavy loads at high temperatures than the next best metal, a high-speed steel. Next in order came high chromium steel, with nickel-chrome steel, and 0.3 per cent carbon steel lowest. The most remarkable resistance to oxidation was shown by the nickel-chromium alloy, the next in rate of scaling being the 14 per cent chromium steel, then the high nickel (25 per cent), with high-speed (tungsten), nickel-chrome steel and carbon steel in that order.

In the subsequent discussion H. Brearley remarked that the results which Mr. Dickenson had set out appeared to extend very considerably the knowledge of the properties of steels at high temperatures over and above that type of knowledge that may be obtained by making an ordinary tensile test piece. The paper had focused attention on the behavior of structural parts at high temperatures. He (Mr. Brearley) thought that for most of them the interest of the properties of steels at high temperatures rather resided in the relative difficulty or ease with which they could be deformed under rolls and hammers and so on, and in this particular respect he drew attention to the results of a number of tests which could be very simply made, but which were extremely difficult to explain. He produced a $\frac{1}{4}$ -in. steel bar—almost any kind of steel, so far as he knew, would serve—which had been raised to a temperature of about 1000 to 1100 deg. C. at one end, and then the heat had been allowed to taper down until, 2 in. from the colder end, it was perhaps about 600 C. This bar was gripped at the hot end in a vise, and then on the other end was put an ordinary joiner's brace, and the bar was twisted. One would naturally expect, from all tensile determinations made on steels at high tem-

peratures, that the bar would twist most where it was hottest. What happened in nearly all cases was that where it was hottest they got a twist of a short pitch, and then somewhere down the metal they got a twist of a longer pitch, and then they got a twist of the shortest pitch of all where the end was coldest.

A long paper by G. A. V. Russell on "Reversing Cogging Mills: Their Drives and Auxiliary Equipment" was withdrawn before the meeting. Other papers were very briefly discussed.

Visits were paid to the works of the Staveley Coal & Iron Co., Ltd., and to the works of the Parkgate Iron & Steel Co., Ltd., while on Tuesday W. McConway gave a film demonstration descriptive of his new process for the production of steel discs by centrifugal methods direct from molten steel.

New England Foundrymen's Association

At the September meeting of the New England Foundrymen's Association, held Sept. 13, at the Exchange Club, Boston, cupola practice was the subject under discussion. One of the most important points brought out was that too many foundries relied on common labor to make proper charges in cupolas, whereas instructions often were not closely followed, which resulted in unsatisfactory castings. The opinion was expressed that some person in authority, preferably a foreman, should be maintained on the charging floor.

The executive committee of the association have arranged for a number of addresses by some of the best and most prominent men connected with the foundry industry, during the coming season. H. P. Blumenauer, Arcade Malleable Iron Co., Worcester, Mass., at the October meeting of the association, will deliver an address on handling of materials around the shop. George A. Ray, Taylor-Fenn Co., Hartford, Conn., vice-president of the association, presided at the September meeting in the absence of E. H. Ballard, president.

Plant Observes Fiftieth Anniversary

On Sept. 13, 1872, the first pipe was turned out at the McKeesport, Pa., plant of the National Tube Co., and last Wednesday, the fiftieth anniversary of that event was observed by officials and veteran employees. Among the latter were two who were employed at the plant at its opening and who still are in active harness, Daniel Turley and Patrick Bligh.

The first product of the plant was 2-in. boiler tubes. Now the range of products includes all kinds of tubular goods, of sizes running from $\frac{1}{8}$ in. to 30 in. in diameter. The original plant occupied only four acres and consisted of one small building. There are now scores of buildings, one of which is the largest mill under one roof in the world, while the plant as a whole is the largest devoted to tubular products in the world. The number of employees has increased from 100 in 1872 to between 7000 and 8000, and the monthly pay roll, which 50 years ago was about \$11,000, now runs up to \$1,000,000 when the plant is running full. From 10 car loads a day, production has grown to an average of 100 car loads, and as high as 150 car loads have been produced in one day.

The first general manager of the plant was John H. Flagler, who died recently in Greenwich, Conn. His successors in that position have been the late E. C. Converse, Horace Crosby, G. G. Crawford, William B. Schiller, now president of the National Tube Co., and Taylor Alderdice, now vice-president in charge of operations of the company, while the present general manager is William A. Cornelius.

The Tourist Camp Body Co., Inc., 1726 Prairie Avenue, Chicago, was recently incorporated with a capital stock of \$10,000, to manufacture automobile bodies. It is building a plant at the above address. It will build bungalows on wheels, including kitchenette equipment, heating systems and electric lighting. The sheet metal work will be let out to contract. The incorporators are: G. B. Haskell, C. Oscar and H. Joshims.

Control of Raw Material to Suit Output

(Continued from page 716)

requisition, Fig. 7, which is the order on the stores department to give the factory the stock required for a certain number of pieces of a specified part. Thus, the requisition for 10,000 pieces of part No. C-88 calls for 112 lb. of $\frac{3}{8}$ -in. screw rod. This material is given to the foreman of the first department to work on the manufacture of the part, in this case Dept. No. 3.

How the Production Department Is Managed

In the manufacturing methods employed in the plant are observed the same careful principles which are applied in the control of raw and finished material stocks. One feature which impresses the visitor is the paucity of special purpose machines. The explanation lies in the determination of the management to attain efficiency without sacrificing flexibility in production. In other words, the introduction of changes in typewriter design is rendered difficult when special manufacturing machinery is used, because it may require the purchase of entirely new equipment and scrapping the old. On the other hand, alterations in the product are relatively easy to effect with standard machines, as all that is required is the use of new dies, jigs or fixtures.

For the manufacture and repair of dies, jigs and fixtures, as well as circular tools for screw machines, the company has a well-equipped tool room. The benches of the tool makers are placed next to the windows so that they have the best of light. The grinding department is set off in an inclosed chamber in one corner. The tool room also has its own individual hardening department which, because it needs light the least, is located in a part of the room farthest from the windows. Replacements and repairs constitute the principal output of the tool room, as the bringing out of a new typewriter model calls for so much new tooling that purchases must be made outside.

All large tools are kept in a fireproof vault when not in use. There are three compartments in the vault, one for dies, one for jigs and fixtures and a third for circular tool sets. The dies and the jigs and fixtures are stored in metal racks, and are arranged according to the parts of the typewriter for which they are used, being identified by both alphabetical and numerical designations. In addition, the dies are differentiated, as to whether they are used for forming or blanking, by the word "form" or "blank." The screw machine tools are arranged in drawers according to the commoner jobs. This scheme is to prevent unnecessary duplication of tools, as one combination of cams may be used for several jobs and likewise a cam in one drawer may sometimes be used in combination with others in different drawers. Both the tool foreman and the master mechanic have records indicating the location of the tools making up all the combinations used.

All of the smaller tools, such as milling cutters, reamers, slitting saws, taps and dies, drills and counterborers, are purchased, as this is cheaper than to make them. These tools are kept in a tool crib adjacent to the vault. An accurate record, of course, is kept of all tools requisitioned by the production department.

Situated near the tool crib and vault, the raw material store room is, like them, conveniently located with reference to the production department. In point of quantity the two principal materials stored are cold rolled strip steel, from which all stampings are made, and cold drawn steel bars, from which the screw machine products are manufactured. Here also is kept all the tool steel used by the tool room. In filling the daily requisitions for this material, received from the tool room foreman, the store department cuts the steel

to length in a hack saw machine. Occasionally, when large diameter material is called for, it is necessary to use a large band saw located in the tool room. All purchased miscellaneous parts, such as wooden cores for the typewriter platens, rubber covers for the platens, knobs, key rings, etc., as well as general factory supplies, are kept in the store room. On an adjacent covered platform castings are stacked to season.

The raw material room is connected by a short aisle with the punch press and screw machine sections of the factory, which are the two primary departments for the production of small parts. Most of the other departments are devoted to secondary or finishing operations, with the drilling, milling, vertical grinding, riveting and polishing machines, and the plating, japanning and hardening divisions of the plant.

Every part of a typewriter is protected in some manner from rust—by white nickeling, black nickeling, oxidizing or japanning. But the precautions taken against rust are no greater than the care exercised in inspection of the parts as they come from the various machines. In some instances, of course, examination by the eye suffices, but parts which must be within close limits are measured with calipers, blueprints indicating the maximum permissible tolerances for the parts being before the inspector while he is measuring.

Castings for the heavier parts of the typewriter are bought outside. There are four main castings in a machine—base, top plate, carriage frame and sub-frame. Each is machined in a department by itself, for the reason that frequent movement of a bulky material is poor shop practice. The polishing and japanning of the castings must of necessity be done in separate departments devoted to this work, in the one case because of the dust generated and in the other because the parts must be baked in ovens. To minimize the movements between these divisions, therefore, the top plate, sub-frame and base departments are situated between the polishing and the japanning rooms. As the carriage frame is neither polished nor japanned, it is handled in another part of the plant. The operations on the three heavy parts just referred to are similar. First, fins are snagged off and the rust is polished off, whereupon the castings are brought to their respective departments and profiled, drilled and milled—generally in the order stated. The last step is the japanning.

Because of both the relative bulk and the expensive-ness of the castings, the production system is arranged so that each part is manufactured by daily quotas. The castings thus are kept moving through the plant, with the result that parts are passing simultaneously through each step in the various finishing operations. This differs from the principle observed in the manufacture of small parts, as already explained. The stock of two-thirds or three-fourths of the small finished parts is normally above minimum, while the remainder will be below—a signal for replenishment.

All completed parts are kept in what is known as the finished stock room. This department has two divisions, one containing all minor units and such single parts as go directly into the final assembly of the typewriter, the other embracing all parts which are entirely finished in themselves but must be assembled into minor units before going into the final typewriter assembly. The assembling of these minor units is done in a department located as near the stock room as proper lighting accommodations permit.

Nesting Done by Women Only

Final assembly of the typewriter is performed in a bay with ample light both from roof monitors and continuous sash in the side walls. In the first stages of the assembly the work is divided into three separate sections according to the three major parts, i.e., the base, top plate and carriage castings. These depart-

ments are parallel to each other and lead into a fourth department where the three units are joined together and various other small parts are inserted.

One of the small assemblies which precedes the complete joining of all parts is "nesting." This consists of fitting all of the 42 typebars so that each will strike exactly "true" in the center of the typebar guide of the machine. To accomplish this the bar is slightly bent or twisted by specially designed pliers. The result required is that each bar fits in the guide so that a piece of cigarette paper will slip past either side without binding or without being loose. This work is extremely exacting and requires an unusual co-ordination of brain and fingers which, it has been found, is possessed only by women. Men tried at this work have failed and, even among women, the number who succeed is not over one in ten.

After the typewriter is completely assembled it passes to the aligning department, where the keys are adjusted so that all letters and figures when typed on a page are on a straight line; thence to the adjusting department, where adjustments are made to obtain a uniform touch for all keys; next to an inspection department, and finally to a dust-proof stock room, from which the machines are withdrawn to be boxed and shipped.

As has just been observed, there is certain work for which women are better adapted than men. In fact, fully one-third of the 500 employees are of the gentler sex. Often they are the daughters or sisters of other operatives and, in some instances, their wives. As typewriter manufacture is the only industry in the city of Woodstock, a community of 6000 people, 50 miles Northwest of Chicago, a large stable body of skilled

typewriter mechanics is being developed, with the likelihood that individual families will become as closely identified with the work as is now the case in certain industrial centers in the East, where for generations son has succeeded father in his craft. The population is thoroughly American in the sense that direct foreign ties date back at least to the parents and are no longer strong.

Radical ideas such as make headway among unskilled aliens gain no foothold in this community. As a matter of fact, there is little work about a typewriter plant that might be termed common labor. Most operations require considerable skill, with compensation proportionate, and superior skill is recognized by a piece-work basis of pay. Some work, of course, is of such a character that it cannot be placed on a piece rate scale, and straight hourly wages are therefore paid. The extent and manner of compensation, however, is not the sole factor affecting the psychology of the employees. The personal relations between management and operatives, who know each other as only neighbors in a small town can, and mingle in a spirit of friendly fellowship, have done much to simplify the industrial relations problem.

The Woodstock Typewriter Co. is a growing institution. In 1918 its production was 35 typewriters daily. An addition, housing the present assembly department, was completed in the winter of 1920, and to-day the output is 100 machines per day. It is evident, therefore, that the careful manner in which both raw material and finished stocks are controlled, the well-worked out organization of the production and assembly departments, and the attention paid to employee personnel are producing results.

Scrap Shortage Predicted by Dealers

Is there a potential shortage of steel scrap? Scrap brokers and large dealers who have canvassed the situation thoroughly claim that there is apt to be less scrap this fall than the steel mills will require and that a steadily advancing market is inevitable. Some mills have stored large quantities of scrap which was bought when prices were low. One Eastern mill has a sufficient quantity on hand for several months' operation, but this is not the situation generally.

An eastern scrap company in analyzing the situation finds that the mills in the East, not including those in the Pittsburgh-Johnstown-Youngstown district, are consuming about 90,000 tons of steel scrap a month, and all of these mills are at present active buyers.

This scrap company says that there is practically no steel scrap left in the hands of the small dealers. There are some large stocks held by large dealers, but it is estimated that these stocks in the aggregate are not more than one month's supply for the eastern mills.

Scrap dealers continue to point to the wide spread in the prices of basic pig iron and steel scrap, a difference of \$13 a ton in the Pittsburgh market; \$11.50 in the Youngstown market, and at least \$14 in eastern Pennsylvania, based on last week's market prices. They say that under more normal conditions of steel plant and blast furnace operation it is inevitable that pig iron shall come down and scrap go up, or that both these movements will develop.

Relief for any threatened shortage of scrap must come chiefly from the railroads and it is probable that large stocks will be available from that source between now and the time snow flies if the resumption of work by shop mechanics results in the speedy repair of a large number of cars and locomotives. The difficulties which the transportation companies have had incident to the shopmen's strike have prevented many of the roads from gathering their usual offerings of scrap.

First Progress Report on Gage Steel Investigation

A program for laboratory work on the wear of gage steels, to be conducted at the Bureau of Standards has been prepared. Arrangements have been made with Dr. John A. Mathews, president Crucible Steel Co. of America, to get a supply of 1.10 per cent carbon and 1.40 per cent chromium-steel for hardening experiments and wear tests and of 0.45 per cent carbon steel for testing the wear of hard disks against soft. As the chromium-bearing steel is at present the most universally used gage steel, it is planned to make the most elaborate tests on it.

While waiting the receipt of appropriate steels for the study of hardening problems, some quenching experiments have been made to determine the characteristic curves, cooling power, and reproducibility of the common quenching media. The heat treatment of several steels in the form of 4-in. cylinders has been studied with the principal object of determining the effect of rate of heating on the dimensional changes. Some of these cylinders showing large dimensional changes on hardening are being measured for time changes.

Labor Conditions in Pennsylvania

PITTSBURGH, Sept. 19.—Restricted immigration is responsible for a general shortage of competent labor in the steel and construction industries, according to the reports of the Pennsylvania State employment agencies. Reports show that as of Sept. 1 the unemployed in the State totaled 32,770, which compares with 125,000 registered for jobs on July 1.

The strike of more than 300 employees of the Steel Car Forge Co., Ellwood City, Pa., was settled Sept. 9 when laborers were given a 20 per cent increase, skilled workmen an increase of 6c. per hour and piece workmen a proportionate increase. The strike was on two weeks.

Labor Problems in Electric Melting

(Concluded from page 725)

disconnecting knife switches on the primary side without making use of the insulated stool or the rubber gloves provided. That they do not care to take the time or expend the energy to play safe should be reason for immediate discharge. If this careless disregard of human life is tolerated from one workman, it is not long before the "disease" spreads among the others.

Things Not to Do

To promote the best results a set of rules should be posted together with a series of "Don'ts." Some of the latter should read: "Don't throw in the main switch while men are working on the furnace roof"; or "Don't touch the relay coils on the automatic regulators, as the electrician is here for that purpose"; or

"Don't try to slip an electrode with the power on." It may seem strange that such matters must be kept constantly before the workmen; and indeed it is not for green workmen that these "Don'ts" are necessary, but for protection against the "wise" workman who always feels that he wants to go his fellow-workman one better. The green workman will always refrain from touching anything which he fears and does not understand, whereas his "wise" companion is probably thinking of how he can best show off his newly acquired ability before the new workman. Many furnace men jeopardize themselves daily by the use of such tactics, to say nothing of an untold amount of trouble they cause their employers. When these rowdy methods are dispensed with and furnace men do their work the safer way, then and then only will they find that their jobs are safe for themselves as well as their fellow-workman.

New Type of French Electric Furnace*

Closed Crucible with Special Features—Girod, Keller and Other Types Compared

THE furnace described in this paper, the idea of which is due to T. Levoz, a French metallurgist, presents certain interesting features, and illustrates one of the latest French developments. The use made of it during the war for the production of high-speed steel demonstrated the principles on which it is constructed.

The refining of a steel bath is effected by the action of the slag, of a fixed composition, on the molten metal. This action is made up of several reactions which require for their realization certain conditions already laid down by Prof. Campbell in the course of a meeting of the (British) Iron and Steel Institute, when the first practical trials of electric furnaces were being made. He laid stress upon the following important points, the realization of which appeared to him essential:

The furnace should be closed as much as possible and should be of the simplest possible construction; the furnace should be entirely separated from the electrical fittings of the generators and transformers, which should be maintained at their highest capacity in order to increase the power of the installation; the wear of the refractory materials of the linings should be saved by applying the heat at the center of the bath, and those of the roof by protecting them from the direct radiation of the arc by the electrodes themselves; the slag should be given as large an area as possible so as to increase the refining surface; and the temperature of the slag should be maintained above that of the steel, so as to secure fluidity and facilitate the high basicity required by an intensive refining process.

Professor Campbell also advised the use of a homogeneous and solid hearth, and with this in view, recommended that electrodes should not be allowed to pass through it. On the other hand, Dr. W. Borchers, who was one of the pioneers of electro-metallurgy, has spoken of the satisfactory results obtained by this latter type of furnace. The principle of this, the Girod furnace, was based on a combination of the resistance arc furnace. The metal to be melted constituted one of the electrodes, the slag covering it forming an electrolytic conductor, the metal constituting the resistance and the current being distributed by one or several carbon electrodes traversing the roof and by multiple contacts passing through the bottom. There was no question of the solidity of this furnace. The advantages arising from a uniform distribution of the current, effected by the arrangement of the contacts passing through the bottom, constituted one of its essential

characteristics, namely that of insuring the efficacy of the furnace's refining action.

The section and length of these contacts were such that no one of them could carry more than a certain fraction of the total current without becoming overheated and, consequently, without its resistance being excessively increased. The regulation of the temperature and resistance of each contact was effected by cooling the hollow extremities by a water circulation system. Certain inconveniences were thus remedied, and as a result of the uniform arrangement of the contacts round the prolonged axis of the carbon electrodes the advantage of a uniform rabbling of the bath was obtained. Professor Campbell's one objection thus disappeared; moreover, the results already obtained at that time demonstrated the furnace's merits.

Girod, Keller and Hewitt Types Compared

When regularly working, the lining, which was chiefly composed of burned dolomite, withstood at least 80 heats. The bottom of the furnace stood 120 to 160 heats without repair and had then lost 100 mm. in thickness. With charges of molten metal the lining could stand 200 operations, and the roof about 20 to 35. The wear of the other parts of the furnace was comparatively slight and the consumption of carbon electrodes was from 12 to 15 kg. (27 to 33 lb.) per ton of steel.

The principle adopted in the Girod-type furnace, which was also to be adopted in the Keller-type furnace with a better distribution of current, thus marked an advance in the construction of electric furnaces. In the Keller-type furnace the distribution of the current in the bath, instead of being merely carried round a certain number of contacts, was effected over the whole depth of the bath by means of a bundle of iron bars surrounded by refractory clay which formed the furnace bottom. The current was introduced by a large carbon electrode rectangular in section.

As in the Girod-type furnace, the intensity of current necessary was high, as it had to reach 3000 amp.; but this high intensity had fewer disadvantages as the current was better distributed and the electric resistance in the large single electrode and in the conducting hearth was not as great. The difficulty of water cooling and of overheating of the carbon electrodes was avoided. The principles laid down by Professor Campbell therefore were observed in this furnace, notwithstanding the fact that the conductors passed through the hearth.

On the other hand, it might be objected that they were not followed in the first furnaces of the Heroult type, in which the better basic action was counteracted by the imperfect closing of the furnace, which was

*Abstract of a paper, contributed through the courtesy of the Association Technic de Fonderie de France, by R. Sylvany and presented at the convention of the American Foundrymen's Association at Rochester, N. Y., in June.

opened by three lateral doors and had the two electrodes passing through it from the roof. Nevertheless the effectiveness of the furnace was not as great as it might have been, although the rectangular surface of the bath was extended, because of the action of the arc being concentrated only in the vicinity of the electrodes. The intensity of the current alone was greatly reduced. The rectangular section, therefore, was unsuitable and at Remscheid it was reduced only to the zone of action of the arcs. The circular form introduced by Nathusius seems to be preferred, and it was this form of section which Heroult adopted for the 15-ton furnace which he built in the United States.

Details of the New Type

All these considerations led the inventor, previously mentioned, to produce a special type of electrical furnace, in which the principles already indicated were further developed and the various defects were minimized. He sought on the one hand, to secure rapidity of fusion and on the other to insure good purification by making the current pass as directly as possible—but at the same time with uniformity of distribution—through the metallic mass and the slag, the furnace being simple in construction, strong and well closed, without an excessive intensity of current being necessary.

For this purpose he constructed a closed crucible with only one opening for charging the material and the additions and for pouring the finished metal. He also placed the large carbon electrode in a sheath to obviate air currents in the space left free between the electrode and the roof. Thus he facilitated a better basic action.

Moreover, certain trials made for the first time at the electric power station of the commune at Jambes in Belgium enabled him to discover the possibility of placing electrodes in the lateral linings of the crucible without their being affected by wear at that level. In fact, as the lateral linings of the furnace presented a larger surface than that of the hearth (bottom), the number of iron conductor bars embedded in the linings can be increased so that their section can be lessened.

Thus a strong magnesite bottom can be composed which resists the action of the overheated metal much better than an armored hearth. Wires of 6 to 10 mm. (No. 9 to No. 3, B.W.G.) were found sufficient to obtain currents of 1200 to 1500 amp, at 85 volts capable of developing the temperatures necessary to purify the entire mass, notwithstanding the depth of the bath.

The electric resistance of the conductor electrodes thus constituted is almost negligible, for, as has already been pointed out, the surface of the linings permits bringing into play a considerable number of wires equivalent to such a large conductance section that, without taking account of the conductivity of the bottom, the loss is already practically nil.

The use of small section metal conductors tends to produce a more uniform circulation of the electric current than the use of large section conductors, and the large surface of the positive carbon electrode is well utilized owing to the excessive splitting up of the current at the surface of the bath. The slag is highly and uniformly heated throughout its surface, and its temperature may be raised to the point required to secure good fluidity and intense chemical action.

Two Rows of Electrodes

To facilitate the process of refining still further the inventor was led to adopt a special device which consists in introducing two rows of superimposed lateral electrodes, the lower ones being termed fusion electrodes and the upper ones refining electrodes.

The fusion electrodes, which vary in number with the capacity of the furnace, are formed by a bundle of pure iron wires imbedded at the base in a mixture of magnesia and tar and united at the top so as to give a good contact with the metal contained in the cross-wise channels arranged in the furnace hearth.

These electrodes are joined in series by a copper bar, which is itself connected by cables to the negative pole of the current transformer. The refining electrodes, which are placed on a level above that of the

others, facing the slag, are also variable in number according to the capacity of the furnace.

A special device enables the current to be taken from the fusion electrodes and afterwards from the refining electrodes, or alternatively from both rows of electrodes at once. The number of wires forming the electrodes, as also the section of these wires, varies with the capacity of the furnace. The wires of the fusion electrodes have always a larger section than those of the refining electrodes.

In every case the current enters by a large vertical carbon electrode passing through the furnace roof, its horizontal section being half that of the furnace crucible. When direct current is employed this large positive electrode is hollowed out and forms a heat reflector; moreover the oxygen of the bath is liberated and is carried to the positive pole instead of remaining in the bath and oxidizing it.

The furnace proper consists of a steel plate body with a non-conducting refractory lining and fitted with a cover. Hollow trunnions, through which the conductor cables pass, enable the whole apparatus to be tilted. The current always passes through a layer of relatively thin metal, which enables currents of much lower intensity to be used. An intensity of 1500 amp. is not exceeded; nevertheless the temperatures obtained are diffused throughout the entire mass of the slag and metal.

This furnace was employed during the war in the production of high-speed steel. It was installed at the Jarville works of the Eclairage Electrique Co., near Nancy, now amalgamated with the Thomson-Houston Co. The results obtained appear to indicate that, with continuous working and by treating 1000 kg. (2205 lb.) per heat with an amperage of 3000 at 80 volts it would be possible with one furnace to obtain an output of eight tons per day by deoxidizing the metal obtained from a converter.

Bounty-fed versus British Steel

A new handicap with which British steel makers are faced is the proposal of the Union of South Africa to grant a bounty for iron and steel produced within the Union. The bounties, according to the *Engineer*, London, will extend over eight years and, beginning at 15s. per ton, will be graded downward, until in the last year they will be only 2s. 6d. per ton. Only works with a minimum capacity of 50,000 tons per annum will be entitled to receive the bounty. Such a policy cannot fail greatly to stimulate the production of iron and steel within the Union and, added to the present handicap of the import duty, may prove a disastrous blow to those British manufacturers who have hitherto looked to South Africa as a market. On the other side, the passing of the "prohibitive" tariff bill by the United States will probably keep out British special steels, while foreign markets nearer home are for all practical purposes closed by the operation of the money exchange. The outlook for British steel is, therefore, anything but bright, and it is not surprising to find the spirit of pessimism rapidly spreading in Sheffield.

Large Output of Portland Cement

Figures of the United States Geological Survey show that the August production of Portland cement, 11,664,000 bbl., was the greatest of any month of the year to date and was more than 10 per cent greater than the largest month of 1921. The total production for eight months this year has aggregated 70,139,000 bbl., as compared with a total of 62,280,000 bbl. for the first eight months of 1921. Present indications are that 1922 will establish a new high record in the production of Portland cement, for 1921 was only slightly less than 1920, the high record year.

Shipments, similarly, were made higher in August than in any preceding month of the year and far higher than in any month of 1921. The figure for August was 14,361,000 bbl. and for the eight months was 76,240,000 bbl., thus reducing stocks by more than 6,000,000 bbl. Stocks reported at the end of August aggregated 5,737,000 bbl.

Metal Schedule of Fordney-McCumber Tariff

(Continued from page 731)

[2½c. per lb.], lead dross [1½c. per lb.], reclaimed lead, scrap lead, antimonial lead, antimonial scrap lead, type metal, Babbitt metal, solder, all alloys or combinations of lead not specially provided for, 2½c. per lb. on the lead contained therein [2½c. per lb.]; lead in sheets, pipe, shot, glazier's lead, and lead wire, 2½c. per lb. (25 per cent) [2½c. per lb.]

394. Zinc-bearing ore of all kinds, containing less than 10 per cent of zinc, shall be admitted free of duty; containing 10 per cent or more of zinc and less than 20 per cent, ½ of 1 per cent per lb. on the zinc contained therein; containing 20 per cent or more of zinc and less than 25 per cent, 1c. per lb. on the zinc contained therein; containing 25 per cent of zinc, or more, 1½c. per lb. on the zinc contained therein. [Here follows the administrative provision—Editor]

395. Zinc in blocks, pigs, or slabs, and zinc dust, 1½c. per lb. [1½c. per lb.]; in sheets, 2c. per lb. [1½c. per lb.]; in sheets coated or plated with nickel or other metal (except gold, silver, or platinum), or solutions, 2½c. per lb. [1½c. per lb.]; old and worn-out, fit only to be remanufactured, 1½c. per lb. (15 per cent) [1c. per lb.]

396. Print rollers and print blocks used in printing, stamping, or cutting designs for wall or crepe paper, linoleum, oilcloth, or other material, not specially provided for, composed wholly or in chief value of iron, steel, copper, brass, or any other metal, 60 per cent ad valorem. (20 per cent) [45 per cent]

397. Cylindrical steel rolls ground and polished, valued at 25c. per lb. or over, 25 per cent ad valorem.

398. Twist drills, reamers, milling cutters, taps, dies, and metal-cutting tools of all descriptions, not specially provided for, containing more than 6/10 of 1 per cent of tungsten or molybdenum, 60 per cent ad valorem.

399. Articles or wares not specially provided for, if composed wholly or in chief value of platinum, gold or silver, and articles or wares plated with platinum, gold, or silver, or colored with gold lacquer, whether partly or wholly manufactured, 60 per cent ad valorem; if composed wholly or in chief value of iron, steel, lead, copper, brass, nickel, pewter, zinc, aluminum, or other metal, but not plated with platinum, gold, or silver, or colored with gold lacquer, whether partly or wholly manufactured, 40 per cent ad valorem.

400. No allowance or reduction of duties for partial loss or damage in consequence of rust or of discoloration shall be made upon any description of iron or steel, or upon any article wholly or partly manufactured of iron or steel, or upon any manufacture of iron or steel.

Free List

Agricultural implements: Plows, tooth or disk harrows, headers, harvesters, reapers, agricultural drills and planters, mowers, horse-rakes, cultivators, thrashing machines, cotton gins, machinery for use in the manufacture of sugar, wagons and carts, cream separators valued at not more than \$50 each, and all other agricultural implements of any kind or description, not specially provided for, whether in whole or in parts, including repair parts: Provided, That no article specified by name in Title I shall be free of duty under this paragraph.

1508. Antimony ore.

1514. Articles the growth, produce, or manufacture of the United States, when returned after having been exported, without having been advanced in value or improved in condition by any process of manufacture or other means if imported by or for the account of the person who exported them from the United States; steel boxes, casks, barrels, carboys, bags, and other containers or coverings of American manufacture exported filled with American products, or exported empty and returned filled with foreign products, including shooks and staves when returned as barrels or boxes; also quicksilver flasks or bottles, iron or steel drums of either domestic or foreign manufacture, used for the shipment of acids, or other chemicals, which shall have been actually exported from the United States; but proof of the identity of such articles shall be made, under general regulations to be prescribed by the Secretary of the Treasury, but the exemption of bags from duty shall apply only to such domestic bags as may be imported by the exporter thereof, and if any such articles are subject to internal-revenue tax at the time of exportation, such tax shall be proved to have been paid before exportation and not refunded; photographic dry plates and films of American manufacture (except moving-picture films), exposed abroad, whether developed or not, and photographic films light struck or otherwise damaged, or worn out, so as to be unsuitable for any other purpose than the recovery of the constituent materials, provided the basic films are of American manufacture, but proof of the identity of such articles shall

be made under general regulations to be prescribed by the Secretary of the Treasury; articles exported from the United States for repairs may be returned upon payment of a duty upon the value of the repairs at the rate at which the article itself would be subject if imported, under conditions and regulations to be prescribed by the Secretary of the Treasury: Provided, That this paragraph shall not apply to any article upon which an allowance of drawback has been made, the reimportation of which is hereby prohibited except upon payment of duties equal to the drawbacks allowed; or to any article manufactured in bonded warehouses and exported under any provision of laws.

1519. Bells, broken, and bell metal, broken and fit only to be remanufactured. (Free list)

1533. Brass, old brass, clippings from brass or Dutch metal, all the foregoing, fit only for remanufacture. (Free list)

1542. Linotype and all typesetting machines, typewriters, [30 per cent] shoe machinery, [45 per cent] sand-blast machines, sludge machines, and tar and oil spreading machines [all 45 per cent] used in the construction and maintenance of roads and in improving them by the use of road preservatives; all the foregoing whether in whole or in parts, including repair parts. (All on free list)

1547. Chromite or chrome ore. (Free list)

1548. Coal, anthracite, bituminous, [45c. per ton] culm, slack, and shale; coke [20 per cent]; compositions used for fuel in which coal or coal dust is the component material of chief value, whether in briquets or other form [20 per cent] (All above on free list): Provided, That if any country, dependency, province, or other subdivision of government imposes a duty on any article specified in this paragraph, when imported from the United States, an equal duty shall be imposed upon such article coming into the United States from such country, dependency, province, or other subdivision of government.

1550. Cobalt and cobalt ore.

1555. Composition metal of which copper is the component material of chief value, not specially provided for.

1556. Copper ore; regulus of, and black or coarse copper, and cement copper; old copper, fit only for remanufacture, copper scale, clippings from new copper, and copper in plates, bars, ingots, or pigs, not manufactured or specially provided for.

1557. Copper sulphate or blue vitriol; copper acetate and subacetate or verdigris.

1562. Metallic mineral substances in a crude state, and metals unwrought, whether capable of being wrought or not, not specially provided for.

1570. Emery ore and corundum ore, and crude artificial abrasives.

1596. Iridium, osmium, palladium, rhodium, and ruthenium and native combinations thereof with one another or with platinum.

1597. Iron ore, including manganiferous iron ore, and the dross or residuum from burnt pyrites.

1619. Minerals, crude, or not advanced in value or condition by refining or grinding, or by other process of manufacture, not specially provided for.

1623. Needles, hand sewing or darning.

1634. Ores of gold, silver, or nickel; nickel matte; ores of the platinum metals; sweepings of gold and silver.

1644. Platinum, unmanufactured or in ingots, bars, sheets, or plates not less than ⅛ in. in thickness, sponge, or scrap.

1661. Shotgun barrels, in single tubes, forged, rough bored.

1684. Tin ore or cassiterite, and black oxide of tin: Provided, That there shall be imposed and paid upon cassiterite, or black oxide of tin, a duty of 4c. per lb., and upon bar, block, pig tin and grain or granulated, a duty of 6c. per lb., when it is made to appear to the satisfaction of the President of the United States that the mines of the United States are producing 1500 tons of cassiterite and bar, block, and pig tin per year. The President shall make known this fact by proclamation, and thereafter said duties shall go into effect.

1685. Tin in bars, blocks or pigs, and grain or granulated and scrap tin, including scrap tin plate. (Free list) (Free list)

1697. All barbed wire, whether plain or galvanized.

Items from Other Schedules

A number of products and materials in which the iron and steel trades are interested appear elsewhere than in the Metal schedule of the new tariff bill. Some of these are given below.

207. Bauxite, crude, not refined or otherwise advanced in condition in any manner, \$1 per ton. (Free)

Fluorspar, \$5.60 per ton. (Free)

201. Bath brick, chrome brick, and fire brick, not specially provided for, 25 per cent ad valorem; magnesite brick, ⅔ of 1c. per lb. and 10 per cent ad valorem.

1536. Brick, not specially provided for: Provided, That if any country, dependency, province, or other subdivision of government imposes a duty on such brick imported from the United States, an equal duty shall be imposed upon such brick coming into the United States from such country, dependency, province, or other subdivision of government.

Graphite or plumbago, crude or refined: Amorphous, 10 per cent ad valorem; crystalline lump, chip, or dust, 20 per cent ad valorem; crystalline flake, 1½c. per lb. As used in this paragraph, the term "crystalline flake" means graphite or plumbago which occurs disseminated as a relatively thin flake throughout its containing rock, decomposed or not, and which may be or has been separated therefrom by ordinary crushing, pulverizing, screening, or mechanical concentration process, such flake being made up of a number of parallel laminae, which may be separated by mechanical means. (Free)

216. Carbons and electrodes, of whatever material composed, and wholly or partly manufactured, for producing electric arc light; electrodes, composed wholly or in part of carbon or graphite, and wholly or partly manufactured, for electric furnace or electrolytic purposes; brushes, of whatever material composed, and wholly or partly manufactured, for electric motors, generators, or other electrical machines or appliances; plates, rods, and other forms, of whatever material composed, wholly or partly manufactured, for manufacturing into the aforesaid brushes; and articles or wares composed wholly or in part of carbon or graphite, wholly or partly manufactured, not specially provided for, 45 per cent ad valorem.

236. Grindstones, finished or unfinished, \$1.75 per ton.

204. Crude magnesite, 5/16 of 1c. per lb.; caustic calcined magnesite, ½ of 1c. per lb.; dead burned and grain magnesite, not suitable for manufacture into oxychloride cements, 23/40 of 1c. per lb.

Provisions for Elastic Tariff

A distinct departure in tariff making for the United States is provided, the administrative provisions calling for an elastic tariff. The President is authorized to increase or decrease the duties and to shift to the American valuation plan (the ad valorem duties in the bill are based on the foreign valuation plan) under certain conditions.

Subdivision (a) authorizes the President to increase or decrease duties and to change classifications whenever necessary to equalize the ascertained differences in costs of

production. No duty, however, may be increased or decreased more than 50 per cent of the duties specified in the bill and no authority is given to transfer from the dutiable list to the free list, or vice versa; nor may any duty be changed from specific to ad valorem, or vice versa. The conferees specified that the differences in costs of production are to be ascertained in the United States and in the principal competing foreign country, and removed the limit as to how long this provision may remain in effect.

Subdivision (c) prescribes the factors which the President is to take into consideration in determining differences in costs of production and also provides that investigations to assist the President in ascertaining such differences are to be made by the United States Tariff Commission. The conferees eliminated the provision of the Senate that the Tariff Commission hearings shall be public and that the President shall make the findings, hearings and testimony in all proceedings public as soon as practicable after the issuance of a proclamation. The President is not authorized to increase rates beyond the specified maximum ad valorem rates fixed in any paragraph. A new section also makes unlawful unfair methods of competition and unfair acts in the importation of merchandise into the United States, which threaten the stability or existence of American industry. Investigations of cases arising under this section are to be made by the Tariff Commission and its findings are subject to review, on questions of law, by the United States Court of Custom Claims. The final findings of the Commission are then transmitted to the President and he is authorized, in case such unfair methods or acts are established to his satisfaction, to impose additional duties upon merchandise imported in violation of the act, and in extreme cases he is authorized to prohibit the offending person from importing any merchandise into the United States. Another provision gives the President discretionary powers to impose additional duties or prohibition upon imports from any country discriminating against the overseas commerce of the United States, and is more far reaching than the precedent established by the Payne-Aldrich act.

Provision also is made for the United States to offer equality of treatment to all nations and at the same time insisting that foreign nations grant to American external commerce equality of treatment. A new section enlarges the powers of the Tariff Commission regarding investigations as to costs of production in this country and abroad, and it is authorized to establish an office in New York for the purpose of conducting investigations, calling witnesses, etc.

RAIL PRICE ADVANCED

Steel Corporation Announces First Change Since October, 1921

The United States Steel Corporation has recommended to its subsidiary companies that on Oct. 1 the price of standard steel rails be increased from \$40 to \$43 a ton, according to the following announcement late Sept. 13 by Elbert H. Gary, chairman:

"Until Sept. 30, 1922, the price of standard rails will continue to be \$40 a gross ton base, f.o.b. mills, for deliveries to be made in about equal monthly installments prior to June 30, 1923. Commencing Oct. 1, 1922, the price will be increased to \$43 a gross ton base, f.o.b. mills, for same deliveries."

The new price for steel rails fixed by the Steel Corporation is the first change since October, 1921, when the quotation was cut to \$40 a ton from \$47, the price recommended by the Industrial Board at Washington shortly after the armistice. In making his announcement Oct. 22, 1921, Chairman Gary said:

"We have decided to recommend that our subsidiary companies reduce the selling price of standard rails to \$40 per ton base, f.o.b. our mills. The present costs of production do not justify this action, but it is hoped and expected that reduction in freight rates and otherwise, together with larger operations, will soon have a beneficiary effect upon our costs."

Prior to that announcement, there had been a differential of \$2 between Bessemer and open-hearth rails, but since the announcement the price has been on the same basis. From May, 1901, until January, 1914, the price of Bessemer rails was \$28. This advanced to \$30 and remained at that figure until May 1, 1916. After most of the requirements of the year had been

contracted for, the makers announced an advance of \$5 per ton, which put open-hearth rails at \$35 and Bessemer rails at \$33. Another advance was made in November, 1916, to \$38 for Bessemer and \$40 for open-hearth. These were the contract prices in 1917, but in line with the advance in other products, rail sales in the second half of that year were made at higher prices, ranging up to \$57. In the early part of 1918, the \$57 price for open-hearth rails was the basis of considerable sales, though at no time during the existence of the conference arrangement between the steel industry and the price fixing committee of the War Industries Board was there a controlled price on rails. Some mills realized considerable higher prices than \$57 in the late months of 1917 and on through 1918 on sales for both domestic use and export. In early 1918, one road paid \$73 on a 2500-ton order. As high as \$85 was realized on some export business. For the greater part of 1918, Washington named \$57 as the selling basis on Army and Navy purchases for the war, but otherwise prices were a matter of negotiation between buyer and seller.

When the Industrial Board announcement of reduced prices on steel products was made on March 21, 1919, a price of \$47 for open-hearth rails was included and this was the basis of Steel Corporation contracts for that year, though it was the fact also that the Corporation reinstated on its books in the first half of 1919 considerable rail business that had been taken at the lower prices of 1917.

Fire at East St. Louis, Ill., did \$10,000 damage to the plant of Benjamin Baits, manufacturer of well-drilling equipment, and \$2,000 damage to the plant of the Atlas Boiler & Sheet Metal Works. The cause of the fire was undetermined.

Machinery Markets and News of the Works

RAILROAD NEEDS INCREASING

Buying of Machine Tools from That Source More Promising

Lima Locomotive Co. Buys \$200,000 Worth of Shop Equipment—Baldwin Works Inquires for 32 Tools

The most promising development in the machine-tool industry is the renewed demand for tools for the repair and building of rolling stock for the railroads. The settlement of the railroad strike on certain roads has released some pending business and considerable more is in sight. The inquiry of the Missouri, Kansas & Texas Railroad at St. Louis for 116 machine tools and allied equipment, on which bids closed Monday, was the most cheering indication in some time of a resumption of railroad buying, which had been checked by the strike.

To keep pace with the demand for railroad locomotives, the Lima Locomotive Co., Lima, Ohio, has placed orders at Cleveland for about \$200,000 worth of new shop equipment and another Ohio company, which is planning to devote its plant to the repair of locomotives, is in the market for \$250,000 worth of new tools. The Baldwin Locomotive Works, Philadelphia, has issued an inquiry for 32 machines, most of them of heavy duty type.

Plans of the railroads apparently are to utilize every possible means to restore their rolling stock to

normal condition, and it was recently announced by one road that it would work its repair shops 24 hr. a day. The Boston & Maine Railroad has contracted for the use of a New England machine-tool plant until March 1, 1923, and will utilize it as a repair shop. The effect of this, however, may be to defer some machine tool purchases that may have been contemplated.

Considerable railroad business is still pending at Chicago. The Chicago, Burlington & Quincy has not yet taken action on its inquiries, while the Chicago, Rock Island & Pacific has bought only a few tools that were imperatively needed. The Long Island Railroad has bought four machines at New York.

The industrial situation is clouded somewhat by the closing down of the Ford plants, which will affect many other industries wholly or partly dependent upon that automobile manufacturing company for business.

The General Motors Corporation, which is planning the manufacture of an air-cooled automobile, has revived a list issued earlier in the year. About 11 tools will be bought. The National Cash Register Co., Dayton, Ohio, has inquired for a number of tools. The Indiana Quarries Co., Bedford, Ind., has bought cranes and several tools.

Several steel companies in the Pittsburgh district have placed orders for steel rolling equipment and cranes for plant additions.

The prices of machine tools continue to strengthen and there have been fresh advances on a number of lines.

New York

NEW YORK, Sept. 18.

ASIDE from the inquiry of the Baldwin Locomotive Works, Philadelphia, for 32 machines, listed in detail in the Philadelphia report, and new inquiries from the General Electric Co., Schenectady, N. Y., for engine lathes, turret lathes, drill presses and other tools, there is no marked activity in the Eastern machine tool market. The Long Island Railroad has bought four machines, an axle lathe, a side-head boring mill, a hub facing machine and a wheel press, and the United Fruit Co. has bought two machines for export to one of its shops. Otherwise there has been no important buying during the week, but prospects continue to be numerous and the trade is hopeful of a growing volume of buying. The machine-tool price structure is strengthening, with fresh advances on a few lines of tools.

The crane market continues quiet, particularly on sales of electric and hand power cranes. Sellers of locomotive cranes still report some competition from the second-hand market. Current inquiries are in most cases for cranes of fairly large capacity, but in one instance, that of the Pennsylvania Railroad, Philadelphia, the original capacities of the inquiry have been reduced. The original tender, which called for two 250-ton, two 60-ton, two 25-ton and six 15-ton electric cranes of various spans, has been revised to ten 15-ton, two 60-ton and two 25-ton electric cranes, the two 250-ton cranes being dropped.

Among recent purchases are:

Presbey-Leland Co., Inc., Brattleboro, Vt., a 20-ton and a 40-ton, 50 ft. span, overhead traveling crane from the Pawling & Harnischfeger Co.

United Lead Co., Perth Amboy, N. J., four 4-ton, 27-ft.,

10-in. span, transfer cranes from the Shepard Electric Crane & Hoist Co.

Phoenix-Portland Cement Co., Philadelphia, Pa., two 80-ft. span, 3 cu. yd. bucket handling cranes for Birmingham, Ala., from the Champion Engineering Co.

Lancaster Steel Products Co., Lancaster, Pa., a 10-ton, 45-ft. span, 3-motor overhead traveling crane from the Northern Engineering Works.

O. J. Dean Co., Chicago, two 5-ton electric traveling hoists from the Northern Engineering Works.

United States Cast Iron Pipe & Foundry Co., a No. 84 Newton cupola crane from the Northern Engineering Works.

Wiardi-Hall Acid Co., Brooklyn, N. Y., recently in the market for a 5-ton, double I-beam hand power crane, has purchased a second-hand crane.

Standard Oil Co., New York, reported last week as purchasing a 20-ton hand power crane, bought from Maris Bros., Philadelphia.

Third Avenue Railway Co., New York, two 3-ton pillar cranes mounted on flat cars from the Chesapeake Iron Works.

Phoenix Utility Co., 71 Broadway, New York, a 60-ton, 1-motor, 24-ft. span, overhead traveling crane from the Niles-Bement-Pond Co. This company is still in the market for a 60-ton, 4-motor, 71-ft. span, overhead traveling crane.

The New York Edison Co., 120 East Fifteenth Street, New York, has commenced erection of a one-story power house, 25 x 100 ft., at Thirty-second Street and Madison Avenue, to cost close to \$200,000, including machinery. William Whitehill, Buckley Newhall Building, Forty-first Street and Sixth Avenue, is architect.

A vocational department will be installed in the new high school to be erected at Saranac Lake, N. Y., for which a bond issue of \$400,000 is being arranged. C. B. Cutler, care of the local Board of Education, is architect.

The Mexican Petroleum Co., Ltd., 120 Broadway, New York, will expend about \$1,000,000 for buildings and equipment for two gasoline extraction plants at its properties in the Tampico district, Mexico, one to be located in the Cerro

Azul field and the other at Chapopote. Construction work is under way on a new oil refining plant at Tampico, estimated to cost \$2,000,000, including machinery, pipe line, pumping plants, etc.

The Lindsay Light Co., 91 Chambers Street, New York, manufacturer of lighting equipment, gas burners, etc., is arranging for the removal of its plant from Chicago to Youngstown, Ohio. The capacity will be increased. The company is increasing its capital from \$1,000,000 to \$1,200,000.

Plans are in progress for reorganization of the Willys Corporation, 52 Vanderbilt Avenue, New York, manufacturer of automobiles, which has been in receivership, a large part of whose plant property recently has been sold. The new organization will take over the assets of the present company and will dispose of a note issue of \$6,000,000, a portion of the proceeds to be used for the acquisition of necessary plants and equipment. John A. Willys, president Willys-Overland Corporation, Toledo, Ohio, is one of the heads of the company.

The Mutual Electric & Hardware Mfg. Co., 28 Verandah Place, Brooklyn, is planning for the installation of new equipment at its plant, including a number of presses.

Freight-handling machinery, cranes, conveying equipment and other mechanical apparatus will be installed at the proposed barge canal terminal to be constructed by the Department of Public Works, Albany, N. Y., on Staten Island. Charles L. Cadle is superintendent of public works, Albany.

The Aetna Auto Engineering Corporation, 258 West Sixty-ninth Street, New York, operating an automobile construction and repair works, has leased the building at 217-19 West Sixty-fourth Street, for a term of years, for plant enlargements. Additional equipment will be installed.

The Sinclair Pipe Line Co., 45 Nassau Street, New York, a subsidiary of the Sinclair Refining Co., has arranged for a bond issue of \$25,000,000, the proceeds to be used in part for new construction, including the doubling of the present capacity of the steel trunk line from Texas, Oklahoma and Kansas to the Chicago district, and for extensions in the vicinity of Houston, Tex., and in the Wyoming fields, with new pumping plants, steel pipe, steel tank storages, etc. J. R. Manion is president.

The Braden Copper Co., 120 Broadway, New York, has preliminary plans under way for enlargements in its copper milling plant, to increase the capacity from 10,000 to 15,000 tons of ore per day. The work, including machinery, is estimated to cost about \$1,500,000.

The Anderson Sheet Metal Co., Providence, R. I., has leased the one-story building at 185-87 Seventh Street, Brooklyn.

The Auto Safety Appliance Co., 1493 Broadway, New York, has leased space in the building at 549-51 West Fifty-second Street.

The William Bayley Co., 110 West Fortieth Street, New York, manufacturer of steel window frames and sash, with plant at Springfield, Ohio, has acquired about 8,000 sq. ft. at Seventh Street and Van Alst Avenue, Long Island City, as a site for a one-story building for an eastern factory branch.

The Shenandoah Steel & Iron Corporation, New York, has leased the four-story building, 40 x 100 ft., at 230-32 West Thirty-eighth Street. Improvements will be made in the building.

The Brunswick Laundry Co., 222 Tonnele Avenue, Jersey City, N. J., will erect a three-story power house, 32 x 38 ft., on a site adjoining its plant, and will use a portion for a machine repair shop.

The Mehl Machine Tool & Die Co., Roselle, N. J., manufacturer of machinery, jigs, dies, etc., will establish a branch engineering works at Cleveland.

A vocational department will be installed in the high school to be erected at Orange, N. J.

A vocational department will be installed in the new two-story high school to be constructed on Main Street, Dumont, N. J., estimated to cost about \$275,000. Ernest Sibley, Palisade, N. J., is architect.

R. Miele, 622 Springfield Avenue, Newark, N. J., operating a forge and blacksmithing shop, is inquiring for an up-right power trip hammer.

The Seagull Fishing Reel Co., operated by Schoenfeld & Gutter, Inc., Newark, N. J., manufacturer of metal fishing reels, has leased a floor in the building at 420 Ogden Street, for the establishment of a new plant.

The Commonwealth Water Co., 20 Northfield Road, West Orange, N. J., will make extensions in its pumping plant at Canoe Brook, including the installation of new pumping machinery, compressors and other equipment, estimated to cost about \$125,000.

Frutchey & Waddell, Woodbury, N. J., local representa-

tives for the Studebaker automobile, are taking bids for the remodeling and improving of a local one-story building, 30 x 150 ft., for a new service and repair works.

A one-story vocational shop will be installed in connection with the new addition to be built at the Hawkins Street school, Newark, N. J., estimated to cost about \$235,000. Guilbert & Betelle, 546 Broad Street, are architects.

The Peters Chocolate Co., Fulton, N. Y., has awarded contract for boiler house, 40 x 80 ft., to Barto-Phillips Co., 52 Vanderbilt Avenue, New York. Estimated cost \$50,000.

The Holbrook Co., automobile body manufacturer, has awarded contract for a manufacturing building 100 x 260 ft., boiler house 20 x 30 ft., service building 20 x 30 ft., and connecting passage 25 x 50 ft., to Barto-Phillips Co., 52 Vanderbilt Avenue, New York. Estimated cost \$80,000. One 100 hp. boiler with 100 ft. radial brick stack and complete sprinkler system with 40,000 gal. steel gravity tank are included.

The Ritter Dental Mfg. Co., Inc., Rochester, N. Y., has been manufacturing dental equipment for several years and is now obtaining figures on equipment for adding a small brass and aluminum foundry to its present plant.

New England

Boston, Sept. 18.

A LARGER number of important machine tools was sold in this territory last week than during the previous week, but business was confined to a limited number of houses. The trade in general is fully as inactive as during the early part of the month. Among the sales of new equipment are: One 40-ton and one 20-ton P & H crane to a Vermont marble concern; one centering machine and one 1½-in. screw machine to a central Massachusetts conveyance builder; a reamer grinder to a Rhode Island concern; three automatic lathes to a Massachusetts textile machinery builder, and a multiple spindle drill to an East Boston concern. A 24-in. shaper constitutes one of the leading sales in the used machine tool market.

It is generally believed here that the ending of the railroad shopmen's strike with some of the railroads will have little influence on the New England carriers as possible machine tool prospects. The Boston & Maine Railroad and the New York, New Haven & Hartford Railroad apparently intend to ignore the union and to keep present shopmen on the payroll. Both roads have let out considerable work since the strike started. During the past week the Boston & Maine Railroad contracted with a New England machine tool builder for the use of its entire manufacturing equipment until March 1, next. With a sizable percentage of repair work farmed out on contract, and with shops well filled with new and more or less unexperienced shopmen, it is believed the purchase of new machine tools by these two roads will be deferred.

The demand for machine tool repair parts and for small tools is good, although spotty. Individual orders often run up well into four figures.

Contract has been let for the erection of a one-story, 40 x 90 ft., manufacturing unit on Columbus Avenue and Dimock Street, Roxbury, Boston, by the Albert Griffiths Saw Co., 30 Whittier Street, Roxbury.

Bids are in on a one-story manufacturing plant for the Thompson Electric Welding Co., 161 Pleasant Street, Lynn, Mass.

The Hamilton Mfg. Co., Lowell, Mass., has awarded a contract for the construction of a re-inforced concrete hydro-electric power plant.

The Crompton & Knowles Loom Works, Worcester, Mass., has sold its Star Foundry Co. property in that city to Edward D. Priest, Schenectady, N. Y. It has not been operated since the war. The property, consisting of a one-story and basement foundry, will be developed for manufacturing.

The Murray-Mack Co., a Pennsylvania concern, has secured a location for a plant to manufacture automobiles at Randolph, Mass., near the railroad and close to the Randolph Foundry Co. plant.

The Universal Winding Co., Cranston, R. I., manufacturer of textile machinery, has arranged for a bond issue of \$2,000,000, a portion to be used for extensions and improvements.

The General Electric Co., Schenectady, N. Y., is planning

the erection of a four-story addition to its plant at West Lynn, Mass., 120 x 157 ft., to cost about \$200,000.

The Star Foundry Co., Worcester, Mass., an interest of the Crompton & Knowles Loom Works, same city, has disposed of its plant to Edward D. Priest, Schenectady, N. Y., for about \$20,000. The plant has been inactive for some time. The new owner will resume production soon.

The American Thermos Bottle Co., Laurel Hill Avenue, Norwich, Conn., has plans under consideration for the erection of a large plant addition.

The Springfield Gas Light Co., 23 State Street, Springfield, Mass., will commence at once erection of a new one-story steam power house, 51 x 58 ft. on Page Boulevard.

The Maine Power Co., Norway, Me., is planning for the installation of additional machinery at its local power plant, including waterwheel, generator and auxiliary electrical equipment.

Kenneth W. McNeil, president of the Karm Terminal Co., Bridgeport, Conn., is the purchaser of the local plant of the Morris Metal Products Co., securing the property at public sale for \$220,500. It consists of a main two-story building, 190 x 375 ft., designed as a machine shop.

A vocational department will be installed in a new high school at Shrewsbury, Mass., estimated to cost about \$150,000. J. William Beal, 62 Summer Street, Boston, is architect.

P. & F. Corbin, Inc., Orchard Street, New Britain, Conn., manufacturer of locks and hardware products, has awarded a contract to William H. Allen, 12 Hungerford Street, for the erection of a plant addition to cost about \$25,000.

The M. S. Little Mfg. Co., New Park Avenue, Hartford, Conn., manufacturer of metal plumbing goods, recently reorganized with \$400,000 capital, has had plans prepared for the erection of a one-story addition, 50 x 65 ft., to cost about \$18,000, exclusive of equipment. The reorganizers, including M. S. Little and H. B. Carey, have also organized the Hartford Valve Mfg. Co., with capital of \$50,000, to manufacture valves and kindred equipment.

Plans have been completed for the erection of a new one-story power house, 75 x 78 ft., at the School for Feeble Minded, Waverly, Mass. C. H. Tenney & Co., 201 Devonshire Street, Boston, are engineers.

The Hope Street Garage Co., Inc., Fourth Street, Providence, R. I., is planning the construction of a 100-car capacity garage and machine shop.

Buffalo

BUFFALO, Sept. 18.

The American Radiator Co., Buffalo, has acquired a tract of land at St. Paul, Minn., totaling about 15 acres, as a site for the erection of a new plant to cost about \$1,000,000. Headquarters of the company is at 820 South Michigan Avenue, Chicago.

The Dunlop Rubber Co., Buffalo, manufacturer of automobile tires, is considering a bond issue of \$10,000,000, a portion of the proceeds to be used for plant equipment and operations, extensions, etc.

The Marsh Valve Co., Fourth Street and Brigham Road, Dunkirk, N. Y., manufacturer of valves and kindred engineering specialties, is planning for the erection of a two-story plant addition, 25 x 35 ft.

The Electric Storage Battery Co., 184 Clinton Avenue South, Rochester, N. Y., manufacturer of storage batteries, plates, etc., has awarded contract to the William Steele & Son Co., Sixteenth and Arch Streets, Philadelphia, for the erection of a new plant on Plymouth Avenue, near Barton Street.

The Owen-Dyneto Electric Corporation, Syracuse, N. Y., recently organized, has taken over the plant and business of the Dyneto Electric Corporation, which has been in the hands of a receiver. Ray M. Owen, president of the new corporation, recently acquired the assets of the former company for \$205,000. The plant will continue in the manufacture of electric starting and lighting equipment for automobile service, generators, etc. James D. Grant is vice-president and treasurer of the new organization.

The Air Sales Reduction Co., 342 Madison Avenue, New York, manufacturer of acetylene welding equipment, etc., has commissioned Francisco & Jacobus, 511 Fifth Avenue, architects, to prepare plans for a new plant at Buffalo, on site selected, estimated to cost about \$50,000.

The North East Electric Co., 348 Whitney Street, Rochester, N. Y., manufacturer of electrical equipment, will erect a two-story addition to its plant, 50 x 90 ft., to cost \$35,000.

The Erie Railroad Co., 50 Church Street, New York, has terminated its contract with the Hornell Repair & Con-

struction Co., Hornell, N. Y., for the operation of its local car shops, as well as similar shops at Salamanca, N. Y., and Susquehanna and Bradford, Pa., effective Sept. 10. The Erie company will resume the direct management of the different plants and proposes to operate at full capacity as soon as men are available. The company is also arranging for the termination of the contract with other interests for the operation of the car and locomotive shops at Corning, Elmira and Binghamton, N. Y.

The Jamestown Novelty Mfg. Co., Gifford Avenue and Jones Street, Jamestown, N. Y., manufacturer of steel enameled bathroom fixtures and kindred products, is planning for installation of new equipment in a factory at River and Chandler Streets.

The International Casement Co., 84 Hopkins Street, Jamestown, N. Y., manufacturer of rolled steel and bronze window casements, etc., has awarded contract to the Warren Construction Co., Jamestown, for the erection of a one and one-half story plant addition, 120 x 150 ft., estimated to cost about \$50,000.

The Skelton Shovel Co., Hamilton, Ont., is calling for bids through McPhie & Kelley, Hamilton, architects, for the erection of a one-story plant on East Lake Road, Dunkirk, N. Y., estimated to cost about \$100,000, including equipment. The Chamber of Commerce, Dunkirk, is interested in the project. W. E. Skelton heads the company.

The Lisk Mfg. Co., Geneva, N. Y., has let contract to Curran-Mason Co., Inc., Rochester, N. Y., for construction of a factory building, 160 x 280 ft., for the manufacture of enamel ware, which with other improvements will involve a total expenditure of \$1,000,000. C. C. Keehn is president of the Lisk Mfg. Co.

The Electric Storage Battery Co., Philadelphia, has obtained a permit for construction of a factory building and assembly plant at Rochester, N. Y., to cost about \$60,000. It will be one story, 134 x 134 ft., and will be erected on Plymouth Avenue, near Barton Street.

Philadelphia

PHILADELPHIA, Sept. 19.

THE Baldwin Locomotive Works, Philadelphia, has issued an inquiry for more than 30 machine tools as follows:

Three 66-in. horizontal boring and drilling machines as follows:

- Two No. 9 vertical milling machines.
- Two No. 1 plain milling machines.
- Two rod milling machines.
- Two frame slotters.
- One frame drilling machine.
- Four frame planers.
- Fourteen standard planers.
- Two turret lathes.

The Edward G. Budd Mfg. Co., Twenty-fifth Street and Hunting Park Avenue, Philadelphia, manufacturer of steel automobile bodies, is completing plans for the erection of a large plant addition. The Ballinger Co., Twelfth and Chestnut Streets, is architect and engineer.

The new building to be erected by Alfred Box & Co., 813 North Front Street, Philadelphia, manufacturer of cranes, hoisting machinery, etc., at Janney and Ontario Streets, will consist of a main one-story structure, 110 x 300 ft., with extension, 15 x 140 ft. The larger space will be equipped as a machine erecting shop and the other as a pattern shop.

The Philadelphia Suburban Gas & Electric Co., Philadelphia, has arranged for a preferred stock issue of \$400,000, the proceeds to be used in part for extensions and improvements. An additional issue of \$600,000, to make up a fund of \$1,000,000 will be disposed of later.

The General Electric Co., Witherspoon Building, Philadelphia has completed plans for the erection of an addition to its local branch plant at Seventh and Willow Streets.

The Logan Ice Mfg. Co., Tenth and Windrim Streets, Philadelphia, is taking bids on a general contract for the erection of a new plant, consisting of four one-story buildings, with main structure, 96 x 182 ft.

Power equipment, ovens, conveying machinery and other mechanical equipment will be installed in a three-story baking plant for the Great Atlantic & Pacific Tea Co., at Ridge and Sedgley Avenues, Philadelphia, estimated to cost about \$80,000, for which a general contract has just been awarded to the Turner Construction Co., Aramingo Street. Headquarters of the company is at 150 Bay Street, Jersey City, N. J.

A vocational department will be installed in the new high

school to be erected at Gloucester Heights, by the Board of Education, Gloucester City, N. J.

The plant of the Empire Tire & Rubber Co., Trenton, N. J., has been acquired by Campbell, Heath & Co., 5 Nassau Street, New York, stock brokers, for \$1,675,000. W. W. Pepper, at one time president of the rubber company, is treasurer of the purchasing concern. It is proposed to form a new company to take over the property, with C. Edward Murray, Jr., Trenton, as head, and resume operations at an early date.

The National Radiator Co., East State Street, Trenton, N. J., has filed plans for the erection of a new one-story addition, to cost about \$17,000.

A two-story and basement vocational school, 70 x 70 ft., to cost about \$70,000, will be constructed by the Falls Township and Overfield Township School Districts, Mill City, Pa.

H. M. Spencer, Dunmore, near Scranton, Pa., is having plans prepared for the erection of a nearby two-story automobile service and repair building, 40 x 300 ft., on Drinker Street, estimated to cost close to \$100,000. A list of equipment for installation is being arranged.

The Lehigh Valley Welding Co., Slatington, Pa., has been organized by Arnold Stoor and Oscar Roth, to operate a local machine shop and welding works.

The International Chain & Mfg. Co., York, Pa., has acquired the local plant of the Victoria Chain Co., manufacturing a kindred line of mechanical chains, and will take immediate possession. Plans are under way for the erection of additional buildings. George J. Campbell is president, and J. L. Mueller vice-president, in charge of production.

The Reading Transit & Light Co., Reading, Pa., is arranging facilities at its local shops for the construction of special cars for its local traction lines, including steel framework, bodies, fittings, etc.

The Stiffel & Freeman Co., Lititz, Pa., manufacturer of locks, safes, vaults, etc., is planning for the erection of a one-story addition, 140 x 175 ft.

The Blair Ice & Cold Storage Co., 3124 Fifth Avenue, Altoona, Pa., is preparing a list of equipment for installation at its new ice-manufacturing and cold storage plant, soon to be constructed. F. H. Sietz is president.

A vocational department will be installed in the new two-story and basement high school at Clarks Summit, Pa., estimated to cost about \$100,000, for which bids on a general contract are being asked until Sept. 25.

A vocational department will be installed in the proposed new high school to be erected at Annville, Pa., estimated to cost in excess of \$100,000.

Pittsburgh

PITTSBURGH, Sept. 18.

DEMAND for machine tools in this territory still runs largely for individual tools, with few lists coming before the trade. The Pittsburgh Board of Education on Sept. 12 took bids on 15 metal working tools and for a number of wood-working machines, but awards have not yet been announced. A maker of lathes is reported to have announced an increase in prices of 12½ per cent, effective Oct. 1, and there also has been a revision upward in prices of Bridgeport grinders. Heavy equipment has shown much activity. The Mackintosh-Hemphill Co., which recently was awarded a 40-in. blooming mill for the Otis Steel Co., Cleveland, in the past week received the award of the sheet bar and sheet mills for that plant. A new strip mill for this company has been placed with the United Engineering & Foundry Co., Pittsburgh.

In addition to the cranes recently placed by the Otis Steel Co. with the Alliance Machine Co., Alliance, Ohio, the company last week placed with the Morgan Engineering Co., Alliance, Ohio, an order for five cranes, one 25-ton with 10-ton auxiliary, 85 ft. span, one 40-ton with 10-ton auxiliary, 85 ft. span, one 10-ton, 25 ft. span, one 10-ton, 75 ft. span and one 10-ton, 105 ft. span.

The Morgan company also has taken a 25-ton crane with 10 ton auxiliary, 68 ft. span for the Republic Iron & Steel Co., Youngstown, Ohio.

The Weirton Steel Co., Weirton, W. Va., has ordered five Shaw cranes for its new sheet mill, one 10-ton, 70 ft. span, to serve the galvanizing and pickling departments, one 10-ton,

70 ft. span, to serve the warehouse, one 15-ton, 55 ft. span for the bar yard, one 30-ton, 75 ft. span for the hot mill department and one 40-ton, with 10-ton auxiliary, 70 ft. span to serve the annealing furnaces.

The Babcock & Wilcox Co. has purchased a 50-ton Shaw trolley for its Barberton, Ohio, plant.

The Center Foundry & Machine Co., Wheeling, W. Va., which is building a new plant at Warwood, W. Va., has bought a 10-ton, 3-motor, 45½ ft. span crane from the Northern Engineering Works, Detroit, and a 66-in. and an 84-in. cupola from the same company.

George R. Fink, who resigned recently as sales manager, West Penn Steel Co., is interested in a new company which will build a sheet plant in Detroit.

The American Window Glass Co., Farmers' Bank Building, Pittsburgh, will take bids at once for the erection of the proposed addition to its plant at Jeannette, Pa., consisting of a main one-story, 12-machine building, estimated to cost close to \$1,500,000. B. J. Pierce, company address, is engineer. W. L. Munro is president.

The International Motor Truck Corporation, 25 Broadway, New York, has leased the one-story building, 137 x 185 ft., now in course of construction at Liberty Avenue and Gross Street, Pittsburgh, for a service and repair works. A special shop for mechanical work will be arranged.

Bids for insulated wire, soft steel wire, tinned iron wire, annealed iron wire, annealed copper wire, wire nails, wire rope, boiler tubes, covering quantities for three months' requirements, will be received by the Pittsburgh & Lake Erie Railroad Co., Pittsburgh, until Sept. 26. C. M. Yohe is purchasing agent.

A vocational department will be installed in the two-story and basement high school to be constructed at Vandergrift, Pa., estimated to cost about \$155,000, for which bids on revised plans are being received until Sept. 30.

The Armstrong Cork Co., Twenty-fourth Street, Pittsburgh, manufacturer of insulation products, is arranging for a stock issue of \$13,000,000, a portion of the proceeds to be used for extensions and improvements, and additions in working capital.

A one-story automobile service and repair works, for company cars and trucks, will be constructed by the Fairmont Creamery Co., 301 Ferry Street, Pittsburgh.

The Raleigh Motor Co., Beckley, W. Va., has plans nearing completion for the construction of a new three-story service and repair building, 50 x 146 ft., estimated to cost about \$65,000.

A vocational department will be installed in the new three-story and basement high school, 225 x 240 ft., to be erected at State and Case Streets, Sharon, Pa., for which bids on a general contract are being received until Sept. 29.

The Fleischmann Co., 508 West North Street, Pittsburgh, manufacturer of yeast, has had plans prepared for a new one-story automobile service and repair building at Western and Allegheny Avenues.

Chicago

CHICAGO, Sept. 18.

PPRICE advances continue to feature the machine tool market. The Brown & Sharpe Mfg. Co. has marked up its line about 10 per cent and a Milwaukee manufacturer of milling machines has likewise announced advances averaging 10 per cent.

Considerable railroad buying is still pending. The Chicago, Burlington & Quincy has not yet taken action on its inquiries, while the Chicago, Rock Island & Pacific has placed a few tools and will buy others against its old list. The latter road has picked out of this list equipment that is imperatively needed and does not intend to buy the balance of the tools at this time. Business from industrial companies is scattered and rarely covers more than one or two machines per purchase. Some of these orders, however, call for large machines and therefore run into considerable money. One dealer, for example, has booked orders for a 36-in. x 36 in. x 12-ft. planer and a 3/16-in. x 8-ft. gate shear.

The Western Steel Car & Foundry Co., Hegewisch, Ind., has placed a 10-ton 88-ft. span electric overhead traveling crane with the Whiting Corporation. The Whiting company has also booked an order for a 120-in. cupola from the Pullman Co. for the latter's new carwheel foundry at Pullman, Ill.

The Electro-Magnetic Tool Co., Nineteenth Street and

Fifty-second Avenue, Cicero, Ill., has purchased the north portion of the G. S. Blakeslee Co. plant in Fifty-second Avenue, near Nineteenth Street, comprising 90,000 sq. ft. of land with buildings containing 15,000 sq. ft. The purchaser will erect an additional building.

The Bates Valve Bag Co., 7310 South Chicago Avenue, Chicago, has let contract for the construction of a two-story factory, 100 x 120 ft., 8232-40 South Chicago Avenue, to cost \$60,000.

The Enterprise Parlor Furniture Co., 2315 West Huron Street, Chicago, has let contract for a third story addition, 100 x 125 ft., to cost \$50,000.

The Florence Art Co., manufacturer of composition lamp standards, book ends and candle sticks, 671 West Ohio Street, Chicago, has let contract for a four-story factory, 50 x 108 ft., North California and State Streets, to cost \$125,000.

The American Casket & Mfg. Co., 1317 West Division Street, Chicago, has let contract for a three-story factory addition, 25 x 70 ft., to cost \$30,000.

Arthur Leher and Angelo Varna have formed a partnership and have opened the Herrin Sheet Iron Metal Works at 109 Madison Street, Herrin, Ill.

The Automotive Gear Works, a new company, will construct a one-story plant with 30,000 sq. ft. of floor space at Richmond, Ind.

The Central Illinois Public Service Co., Mattoon, Ill., will soon call for bids for the erection of a new power plant on the Mississippi River, near Grand Tower, Ill., estimated to cost about \$2,000,000, including machinery. Sargent & Lundy, 72 West Adams Street, Chicago, are engineers.

The Eaton Metal Products Co., 3254 Walnut Street, Denver, Col., is planning for the installation of new equipment at its plant, including a number of presses for stamping and bending metal goods.

The Nebraska Power Co., Omaha, Neb., has arranged for a bond issue of \$3,500,000, a portion of the proceeds to be used for extensions and improvements. A. S. Grenler is vice-president.

The City Council, Marshall, Ill., will receive bids until Oct. 5 for the construction of a new municipal power plant, with ice-making and refrigerating plant extension, to include two generators, Corliss engines, two water tube boilers, feedwater heater, feed pumps, piping, etc.; also ice-manufacturing machinery for an initial capacity of 15 tons a day. F. L. Wilcox, Chemical Building, St. Louis, is engineer.

J. J. Stone, International Falls, Minn., has plans prepared for the erection of a new one-story and basement automobile service and repair works, 75 x 85 ft., with machine shop. Bids will soon be asked. William P. Allard, Ferguson Building, Duluth, Minn., is architect.

A new one-story power house, 79 x 89 ft., will be constructed at the State Illinois Soldiers' and Orphans' Home, Normal, Ill. Bids for the plant are being received until Sept. 26 by C. R. Miller, chairman of Public Works and Buildings, Springfield, Ill. Edgar A. Martin, 410 South Wabash Avenue, Chicago, is architect.

The Chicago, Burlington & Quincy Railroad Co., 547 West Jackson Boulevard, Chicago, is completing detailed plans for the erection of its proposed new shops at Denver, Col., to be located on a 275-acre tract of land at Fifty-first Street, near Broadway, recently acquired. Six main buildings will be constructed, including machine shop, forge and blacksmith shop, boiler shop, oil house, power plant, and storehouse and office. The entire plant with machinery is estimated to cost in excess of \$1,500,000. T. Krausch, engineer of buildings for the company, will be in charge of erection.

Detroit

DETROIT, Sept. 18.

INQUIRIES on machine tools have been very light since the first of the month but there have been no deliveries extended on orders already placed. Undoubtedly the fuel situation has had a depressing effect on new business. Representatives of machinery manufacturers are optimistic, however, and are anticipating a reflection of the improved industrial outlook early in October. The shut down of the Ford plants is apt to be seriously felt if long continued.

The Kalamazoo Blow Pipe Co., 408 North Church street, Kalamazoo, Mich., will soon take bids for the erection of a new one-story plant, 35 x 155 ft., on North Church Street, to cost about \$50,000. E. S. Batterson, Hanselman Building, is architect. H. F. Brundage is president.

The Detroit Edison Co., Detroit, will build a new one-story power house at Mt. Clemens, Mich., to cost about \$150,000, including equipment.

The Burr-Patterson Co., 4211 Woodward Avenue, Detroit, manufacturing jeweler, will commence the immediate erection of a new two-story plant, 40 x 105 ft., to cost close to \$50,000, including precision tools and other equipment.

A vocational department will be installed in the three-story high school to be erected at Eaton Rapids, Mich., to cost about \$125,000, for which bids on a general contract will be asked soon.

The Muzzy-Lyon Co., Detroit, manufacturer of engine bearings, babbitt alloys, etc., has removed its plant from 535 West Larned Street, to a new building on Shoemaker Street, near St. Jean Street. The structure will provide a total floor area of 36,000 sq. ft., which will be entirely utilized with present equipment from the former works and new machinery. J. H. Muzzy is president and general manager.

The Fisher-Ohio Body Corporation, General Motors Building, Detroit, manufacturer of automobile bodies, has awarded a contract to the Realty Construction Co., Flint, Mich., for the erection of a new two-story plant on Wilcox Street, Flint, 200 x 400 ft., to be equipped for assembling. Albert Kahn, 1000 Marquette Building, Detroit, is architect. Fred J. Fisher is president.

The Kessler Sales & Service Co., 4627 Dix Avenue, Detroit, is arranging for the installation of additional equipment at its service and repair works. A list of machinery will be prepared at an early date.

The Flint Steel Co., Flint, Mich., recently organized, has acquired the entire plant and business of the Perkins Structural Steel Co., which has been operating a local works for about a year past. The new company will take immediate possession. W. L. Perkins is president and general manager.

The Briggs Mfg. Co., Hamtramck, Mich., has plans under way for the erection of a new one-story power plant at its works, 80 x 83 ft. The company specializes in the manufacture of automobile bodies. M. L. Briggs is secretary.

The Department of Street Railways, Shoemaker Street, Detroit, is planning for the construction of a new one-story machine and mechanical repair shop on Woodward Avenue, estimated to cost about \$100,000, including equipment. W. C. Markham, 312 Marquette Building, is engineer.

The Progressive Club, Montague, Mich., is arranging for the establishment of a new industry at the plant of the Montague Iron Works, which has been idle for about three years. The new company will remodel the works for the manufacture of piston rings and kindred automotive products, with the installation of new equipment.

The Bryant Paper Co., Kalamazoo, Mich., has announced an extensive building program including a new power plant and a machine shop.

The Monroe Auto Equipment Co., Monroe, Mich., is erecting a foundry, 64 x 100 ft., in connection with its present plant. This company manufactures automobile pumps and brake shoes and the new foundry will give it capacity for production work beyond its own needs. Officers of the company are C. S. McIntyre, president; W. S. Meyers, secretary and general manager.

The C. G. Spring Co., manufacturers of spring bumpers, has taken a five year lease on the building formerly occupied by the Detroit Stoker Co., West Grand Boulevard, east of Russell Street. The building contains approximately 17,000 sq. ft., which will be utilized for manufacturing purposes and as a service station.

The Ford Motor Co. will erect an experimental laboratory, one story, steel, 200 x 800 ft., at Dearborn, Mich. Albert Kahn is architect.

In connection with its entrance into Detroit, the Pennsylvania Railroad system has announced the awarding of contracts covering four building projects which will form the principal unit of the roads general operating plans for this territory and which before completed will involve an expenditure of approximately \$20,000,000. The present construction includes an engine house at Ecouse, freight house, 70 x 680 ft., at Third and Larned Streets, to cost \$200,000 and a turn table, water and coaling station at Third and Summit Streets.

The Cerruti Aircraft Corporation, capitalized at \$100,000, has begun operations at 3834 Grand River Avenue, Detroit, manufacturing airplanes. Officers of the company are Lieut. Frank A. Cerruti, president, Floyd F. Williams, vice-president and L. V. Martin, secretary and treasurer.

The Wheel Truing Co. is erecting a modern factory building at Oakland and Victor Avenues, Highland Park. Special equipment has been ordered for the manufacture of truing wheels, diamond dies for wire drawing, shaped carbon tools for turning hard rubber, fiber and celluloid and diamond saw teeth for cutting stone and marble. Harvey B. Wallace is general manager.

Baltimore

BALTIMORE, Sept. 18.

The Baltimore Steel Co., Eastern Avenue and Eden Street, Baltimore, has purchased property adjoining its plant, totaling about 20,000 sq. ft., as a site for an addition. Plans are under way for the new building, estimated to cost \$200,000, including equipment. The company specializes in the fabrication of structural steel, ornamental steel and iron products, etc.

The Security Cement Lime Co., Equitable Building, Baltimore, has arranged for a note issue of \$300,000, the proceeds to be used in part for extensions to its cement manufacturing plant at Security, Md. The present works will be enlarged and additional machinery installed to increase the capacity from 950,000 barrels to 1,400,000 barrels a year. Loring A. Cover is president.

A three-story automobile service and repair building for company trucks and cars, with machine and mechanical repair works, and fire plant, 76 x 110 ft., to cost about \$75,000, will be erected by the Corby Baking Co., 2301-7 Georgia Avenue, N. W., Washington, D. C., on site in the vicinity of the baking plant. Col. P. M. Anderson, 705 Southern Building, is consulting engineer.

The Consolidated Machine Tool Corporation, 17 East Forty-second Street, New York, has awarded a general contract to the Shoemaker-Satterthwait Bridge Co., 4 South Fifteenth Street, Philadelphia, for the erection of a new two-story foundry at its Hilles & Jones plant, Ninth and Church Streets, Wilmington, Del., 98 x 240 ft., steel and concrete.

The City Council, Elizabeth City, N. C., has tentative plans for the construction of a new municipal electric light and power plant, in connection with new waterworks and pumping plant, to cost about \$750,000. About five acres has been acquired in the Knobb's Creek district for the plants.

The Purchasing Agent, Post Office Department, Washington, D. C., will receive bids until Sept. 22, for 72 dozen steel oilers.

The Allen Transfer & Repair Co., 1715 West Cary Street, Richmond, Va., is planning for the installation of new equipment at its machine works, including lathe and drill press.

The City Manager, P. C. Painter, Greensboro, N. C., will receive bids until Oct. 10, for equipment to be installed in connection with a new filter plant at the waterworks, including one 1,000-gallon per minute, motor-operated pumping unit; steel wash water tank, 70,000 gallons capacity; piping, valves, and other kindred miscellaneous equipment. J. L. Ludlow is consulting engineer.

The Snapp Foundry, Inc., Winchester, W. Va., recently organized with a capital of \$50,000, will take over the local plant and business heretofore operated as the Snapp Foundry Co. The company will continue the operation of the plant for the manufacture of power ice saws, etc., and contemplates expansion in the near future. C. Arthur Robinson is secretary.

The Queen City Iron & Metal Co., Charlotte, N. C., has acquired the plant of E. I. du Pont de Nemours & Co., at Georgetown, S. C., heretofore devoted to the manufacture of industrial alcohol and kindred products, and will use it for plant extensions.

The Consolidated Gas, Electric Light & Power Co., Lexington Building, Baltimore, has arranged for a bond issue of \$5,000,000, a portion to be used for extensions and improvements. Herbert A. Wagner is president.

The Standard Variometer Co., City Point, Va., recently organized, has arranged for the operation of a local plant for the manufacture of radio equipment and parts, and kindred electrical specialties. P. B. Woodward is president.

In connection with its proposed new electric generating plant at Williamsport, Md., the Potomac Public Service Co., Hagerstown, Md., will install an electrically-operated overhead traveling bridge crane, with capacity of about 40 tons. The station will have a generating capacity of about 15,000 horsepower, and other machinery to be installed includes mechanical stokers, economizers, marine type boilers, condensers, vaporizers, electric generators, exciters, switchboards, pumping machinery, and auxiliary equipment. The entire plant will cost approximately \$1,500,000. Sanderson & Porter, 52 William Street, New York, are engineers. The company is operated by the American Water Works & Electric Co., 50 Broad Street, New York.

A vocational department will be installed in the new high school to be erected at Crisp, N. C., by the Edgecombe County School Board, Speed, N. C. Plans have been prepared.

The City Council, Harrisonburg, Va., is planning for the immediate construction of its proposed new steam-operated electric power plant, estimated to cost about \$80,000, for

which plans have recently been completed. It will have an initial capacity of 500 kilowatts and which will be increased at a later date.

The Anderson Motor Co., Rock Hill, S. C., manufacturer of automobiles, has preliminary plans for an addition to its plant.

The Imperial Tobacco Co., Richmond, Va., is planning for improvements in the power house at its plant, to include the installation of oil-burning equipment to replace the present coal burning plant. Inquiries are being made as to different types of equipment.

Cleveland

CLEVELAND, Sept. 18.

AN Ohio company that will equip its plant for a locomotive repair work will require approximately \$250,000 worth of machinery and placed orders for a few tools during the week. One other important feature of the market is the purchase of 35 or more tools aggregating approximately \$200,000 by the Lima Locomotive Co., for its plant extensions. Over half of this business went to the Niles Tool Works, the remainder being divided between three other distributors. The Niles Co. took 12 6 ft. Right Line radial drills, six Pond planers, five 60 in., one 90 in. and a 50 ft. triple head Bement locomotive frame slotting machine. Additional purchases reported included three planers, a vertical rod boring machine, a vertical rod milling machine, axle turning lathe, four 20 in. engine lathes, two tool makers' lathes, a 60 in. wheel press, cylinder boring machine, two 18 in. slotting machines, a horizontal boring and milling machine and two turret lathes.

Dealers are getting a fair volume of business in single tools. Turret lathe manufacturers report an improvement in a scattered demand for single tools.

More price advances are coming out, being made by manufacturers who had not previously marked up their prices to meet the increasing cost of manufacture. The Monarch Lathe Co., Sidney, Ohio, has advanced its line of lathes 10 per cent and an Ohio manufacturer of turret lathes has advanced its price approximately 10 per cent. A large Eastern machine-tool manufacturer withdrew outstanding quotations Saturday and will announce price advances this week.

The Sterling Stone & Lime Co., Delaware, Ohio, will erect a stone crushing plant with a capacity of 1200 tons per day. H. E. Culbertson is president and J. T. Herrick, vice-president and general manager.

The C. L. Dover Foundry Co., Bellaire, Ohio, has commenced the erection of a foundry addition 35 x 60 ft.

The Smokeless Oil Burner Co., Bucyrus, Ohio, has been incorporated with a capital stock of \$25,000 and will manufacture oil burners for industrial purposes. The burner has been manufactured for two years under a partnership arrangement. C. W. Moore and P. H. Ryder are understood to be the principal owners of the company. They are associated with the Ryder Brass Foundry in Bucyrus.

The Barberton Machine & Foundry Co., recently incorporated with a capital stock of \$10,000, has purchased the property and patents of the Keyless Lock Co., Akron, Ohio.

The American Shipbuilding Co. has placed a contract for a one story, 50 x 60 ft. factory building to be erected in connection with its Cleveland shipping yard.

The Towmotor Co., Cleveland, has just shipped two tow-motors to New South Wales. Other recent purchases include two machines purchased by Ball Bros. Glass Mfg. Co., and one by the Carnegie Steel Co.

The L-M Axle Co., Cleveland, announced that it has completed negotiations for acquiring the plant of the Jones Gear Co., Wayside Road and the Nickel Plate Railroad, Cleveland. This is virtually a new plant. The main building is 100 x 200 ft. and there are other buildings including a heat treating department. It is reported that the buildings and machinery were sold for about \$500,000. George B. Durell, treasurer of the American Fork & Hoe Co., is president of the L-M Axle Co., and J. S. Vaughan is secretary.

The plant of the New Process Gear Corporation, Syracuse, N. Y., which was a subsidiary of the Willys Corporation, has been sold to Thomas W. Warner, Toledo, Ohio, for \$1,904,000. Mr. Warner has been prominently identified with

the automotive industry in the Central West and was formerly vice-president of the General Motors Corporation. He is at present vice-president of the Durant Motors, Inc., of Indiana.

The monthly report of the Ohio State Foundrymen's Association compiled from data supplied by about 50 members shows a considerable increase in operations during August. On Sept. 1 the plants reporting were melting at 79 per cent of capacity as compared with a 58 per cent melt Aug. 31.

Cincinnati

CINCINNATI, Sept. 18.

THE feature of the machinery market during the past week was the receipt of the Missouri, Kansas & Texas Railroad list, for shops at Bellmead, Tex., which calls for approximately \$500,000 worth of equipment. The list includes complete equipment for a large shop, and as bids are to be in Sept. 18, it is expected that purchasing of tools will be begun in a short time.

The National Cash Register Co., Dayton, Ohio, has a list out for a number of tools on which action is expected this week. The General Motors Corporation, which is planning to turn out an air-cooled car, has revived a list of tools issued early in the year, and on which no action had been taken. It is expected that at least 11 miscellaneous machines will be purchased. The original inquiry called for 29, but some of these tools have been supplied by various units of the corporation. Inquiries for single machines show a fair improvement over the previous week, and with a settlement of the rail strike in sight, it is expected that the machinery market will be given a healthy stimulus, particularly as prices generally show strength. Recent announcements of stiffening prices have had the effect of bringing in quite a few orders, particularly for shapers. There have been no large orders placed.

The Indiana Quarries Co., Bedford, Ind., which will build a new plant to replace the one destroyed by fire some months ago, has placed orders for the equipment for its new buildings, which included a number of cranes, and miscellaneous machine tools. Agricultural implement manufacturers, who have been displaying their products at various fairs throughout the country, report very much interest being shown by farmers in their exhibits, and it is expected that buying will be good during this fall and next winter.

The Rahn-Larmon Co., Cincinnati, manufacturer of gap and engine lathes, has advanced its list price 12½ per cent effective Sept. 15.

The Ironton Boiler Works Co., Ironton, Ohio, has been incorporated with a capitalization of \$50,000. The company has been operating as a partnership. Additions to plant and equipment, to take care of increasing business, are planned. P. F. Meehan heads the company.

The Cincinnati Valve Co., Cincinnati, has been incorporated with a capitalization of \$10,000 and will manufacture a new type of steam valve. The plant will be located on Richmond Street. Thomas F. Bickett is general manager.

The Morton Last Co., Cincinnati, has been incorporated with a capitalization of \$125,000, to manufacture shoe lasts. The plant will be located at Third and Eggleston Avenue. Charles P. Morton is president.

Contract will be awarded this week for the construction of the new plant of the J. A. Fay & Egan Co., Cincinnati, which will cost, with equipment, approximately \$500,000. The plant will be located in the Bond Hill section of the city. The company is one of the largest manufacturers of wood-working machinery in the world, and when the new plant is in operation will greatly increase its capacity. Part of the equipment for the new plant has been contracted for. Clifford Egan is president.

Negotiations are being conducted for the purchase of the property of the Barney & Smith Car Co., Dayton, Ohio, now in receiver's hands, by a large Eastern car manufacturing company. It is understood that the company has made an offer close to \$2,000,000 for the property, which is now being considered by the bondholders' protective committee. Should the deal go through it is planned to operate the plant at once, principally on car repair work.

Milwaukee

MILWAUKEE, Sept. 18.

ADMITTEDLY a great load has been removed from the minds of the men engaged in the machine-tool industry by the effect of the settlement of the railroad shop crafts strike, which likewise has eased the tenseness of the situation of general business. While the outcome had been discounted and at the outset opinion varied only with respect to the duration of the strike, it was probably of more moment to the tool trade than almost any other that such a contingency should arise. Unquestionably the calling of the shop strike caused railroad companies to postpone very heavy purchases of equipment sorely needed, and now that this trouble has been overcome, manufacturers as well as dealers expect to receive some sizable business affecting virtually every line of tools.

The Elwood Tractor Co., Madison, Wis., is moving works and offices to Paris, Ill., having taken over the entire business, plant and equipment of the Paris Mfg. & Engineering Co. For several years the Elwood company has maintained a small experimental and development shop in Madison, and it is now ready to engage in quantity production of tractors. An output of 1000 machines in 1923 has been laid out and purchases of materials as well as additional shop equipment are being made on this basis. H. A. Burd, general manager, and C. D. Elwood, chief engineer, continue in charge of the business under the physical merger with the Paris company.

The North Milwaukee Foundry Co., North Milwaukee, Wis., sustained an estimated loss of \$35,000 in the destruction of its shop on Commerce Avenue by fire of undetermined origin on Sept. 15. No decision will be made concerning the erection of a new plant until the loss has been adjusted.

The Milwaukee Air Power Pump Co., 886-890 Third Street, Milwaukee, will build a new plant, 130 x 150 ft., one story, of brick and steel construction, on a new site on Keefe Avenue, west of Humboldt Avenue, at an estimated cost of \$75,000. The Erich G. Schroeder Co., consulting engineer, 405 Broadway, local, is preparing plans and equipment specifications. Work is expected to start about Oct. 1. John R. Ball is president and treasurer.

The Wisconsin Re grinding Co., Sheboygan Falls, Wis., conducting a general machinery repair and automobile engine service shop, with a branch at Fond du Lac, Wis., will establish a second branch at Rhinelander, Wis. A new shop, about 30 x 75 ft., will be erected, and new equipment installed. Roy Nichols, vice-president, has been assigned to the Rhinelander branch as manager. William Findlay is president and A. P. Schneidewent, secretary and treasurer.

The C. C. C. Co., Oshkosh, Wis., manufacturer of patented folding beds, davenport, etc., has taken over the plant and business of the Juul-Peterson Mfg. Co., 83 High Street, local, which manufactures hardware specialties and metal parts and appliances for furniture, etc. It is the intention to erect a new factory and shop building during the winter and consolidate the operations, but for the present the C. C. C. Co. will continue to occupy its quarters at 29 Main Street, and the Juul-Peterson company its High Street shop, where it will continue to do a jobbing business in addition to supplying the needs of the parent concern.

The Board of Education, Drummond, Bayfield County, Wis., is taking bids until Oct. 3 for the construction of a new high, graded and vocational training school, 55 x 123 ft., three stories and basement, estimated to cost \$150,000. E. G. Carter is clerk.

The Rex Typewriter Co., Fond du Lac, Wis., is purchasing a small list of additional equipment and increasing its operating force gradually to facilitate quantity production of a new design of portable and demountable typewriter which has been perfected and is ready for the commercial market. An output of 100 to 125 machines a day is expected to be reached by Jan. 1.

The Burdick Cabinet Co., Milton, Wis., manufacturer of cabinets, radio cases, talking machine panels, etc., has engaged the Federal Engineering Co., 444 Milwaukee Street, Milwaukee, to design a brick and steel manufacturing addition, 80 x 160 ft., part two stories and basement, estimated to cost \$50,000. Specifications of new equipment needs have not been completed.

The Motor Grinding Co., Milwaukee, is the style of a new corporation which has been organized to establish a general machine and repair business, specializing in regrinding gas engine cylinders. The incorporators are members of the law firm of Fish, Marshutz & Hoffman, 1115 Wells Building, Milwaukee.

The H. A. Poppert & Son Co., 421-423 Third Street, MI-

waukee, manufacturer of metal and wood patterns, dies, etc., has increased its capital stock from \$75,000 to \$150,000. The plant has been undergoing general improvement and enlargement for the past six months. Russell L. Poppert is secretary and treasurer.

The E. J. Woodlson Co., Detroit, Mich., foundry facings, equipment, fire brick, platers and polishers' supplies, maintaining a branch shop and warehouse at 484-494 Virginia Street, Milwaukee, has been granted a Wisconsin charter. The application gives the capital stock as \$600,000 and the Wisconsin proportion as \$19,470. J. M. Witters is manager of the Milwaukee branch.

The Manitowoc Foundry Co., Manitowoc, Wis., has filed amendments to its corporate articles to effect a reduction in its capital stock from \$50,000 to \$30,000. David Balkansky is president, and H. L. Meyer, secretary.

The New Cornelia Copper Co., Ajo, Ariz., will build a new concentrator plant costing about \$500,000 and has let the structural steel, amounting to 2,500 tons, to the Wisconsin Bridge & Iron Co., Milwaukee.

The Cleveland-Cliffs Iron Co., Cleveland, has acquired the entire properties of the Interstate Coal & Dock Co. at Green Bay, Wis., a port which accommodates the largest vessels operating on the Great Lakes. W. J. McCormick has been appointed resident manager. The property is to be improved and enlarged, but no definite details have been made public.

Indiana

INDIANAPOLIS, Sept. 18.

The Duesenberg Co., South Harding Street, Indianapolis, is said to be arranging a list of equipment for installation in its new one-story plant addition, 60 x 200 ft., on which construction was recently commenced, to be used for motor assembling. Chester S. Ricker is manager in charge.

The Studebaker Corporation, South Bend, Ind., manufacturer of automobiles, has awarded a contract to the J. G. Christman Co., South Bend, for the erection of two additional floors on the present two-story plant structure known as Building 79. Work will be commenced at once. Albert Kahn, 1000 Marquette Building, Detroit, is architect.

The Terre Haute, Indianapolis & Eastern Traction Co., Indianapolis, is completing plans for the erection of an addition to its electric power plant on West Tenth Street, and for extensions in its transmission system in this section. The work will include the installation of new equipment.

A vocational department will be installed in the new high school addition at Bloomington, Ind., now in course of erection, estimated to cost about \$200,000.

Electric pumping machinery and auxiliary mechanical equipment will be installed in the new water plant to be constructed by the Upland Water Co., Upland, Ind. The Public Service Commission has granted permission for a bond issue of \$45,000.

The Interstate Public Service Co., Indianapolis, is planning for extensions and improvements in its plant and system to cost about \$500,000. Harry Reid is president.

The Wabash Electric Co., Clinton, Ind., has tentative plans under consideration for extensions and improvements in its plant and system to cost about \$50,000.

The Pacific Coast

SAN FRANCISCO, Sept. 16.

The Doble Steam Motors Co., 714 Harrison Street, San Francisco, manufacturer of steam-operated automobiles, will soon take bids for the erection of a new plant at Atascadero, Cal., to consist of a main one and one-half story works, 100 x 500 ft., estimated to cost approximately \$100,000, including machinery. The Home Builders' Service Bureau, Atascadero, is architect.

The San Geronimo Power Co., First National Bank Building, San Francisco, has preliminary plans under way for the erection of a new hydroelectric power plant on the San Geronimo River, San Bernardino County, Cal., with initial capacity of 4900 hp., estimated to cost approximately \$300,000, including machinery and transmission line. Application has been made to the State Water Supply Commission for permission to use the power site.

The Orestimba Union High School District, Newman, Cal., has plans nearing completion for the erection of a new one-story vocational shop at the local high school. W. F. Reid, Concord, Cal., is clerk of the district board.

Edward Fletcher, 920 Eighth Street, San Diego, Cal., is forming a company to construct and operate a hydroelectric power plant on the Santa Ysabel and Black Canyon Creeks. It will have an initial capacity of about 3100 hp. and is estimated to cost approximately \$350,000.

H. V. Glore, 2053 Thirty-eighth Avenue, Oakland, Cal., is planning for the erection of a new one-story machine shop on Fifth Street, near Alice Street.

The San Joaquin Light & Power Corporation, Fresno, Cal., has preliminary plans under consideration for the erection of a new hydroelectric generating plant on Whisky Creek, with capacity of about 24,000 hp. Application has been made to the State Water Supply Commission for permission to build the plant.

The Atchison, Topeka & Santa Fe Railway Co., Kerckhoff Building, Los Angeles, Cal., has awarded a contract to Charles A. Fellows, 500 Central Building, for the erection of a new one-story machine shop at Albuquerque, N. M., 141 x 415 ft., divided into heavy machinery and erecting bays, respectively. A one-story adjoining building will be built for mechanical service, 84 x 86 ft. The installation will include a 90-ton and 15-ton electric traveling cranes.

The Union Pressed Steel Co., Twenty-ninth Avenue and Ford Street, Oakland, Cal., is planning for the rebuilding of its plant, destroyed by fire Sept. 2, with loss estimated at about \$125,000, including machinery. The company is operated by the Union Construction Co.

The Central South

ST. LOUIS, Sept. 18.

THE list of machine tools and allied equipment inquired for by the Missouri, Kansas & Texas Railroad, comprising 116 items, for its shops at Bellmead, near Waco, Tex., closed to-day. Among the items listed were the following: Air compressor, feed water heater and pumps, water tube boilers, electric traveling cranes, armature machines, sensitive drills, band saw, rip saw, cut-off saw, squaring shear, splitting shear, tinner's roll, pipe threading machines, hydraulic driving box press, journal turning lathe, car wheel lathe, boring and turning mill, driving wheel press, piston rod grinding machine, hydraulic press, plain milling machines, draw-cut shaper, crank shapers, vertical turret lathes, vertical boring and turning mills, heavy duty planer, heavy duty slotter, emery wheel grinding machines, power hack saws, horizontal boring and drilling machine, crank planer, double-head bolt cutter, triple-head bolt cutter, rotary cold cut-off saw, high-power drilling machines, locomotive guide bar grinding machine, duplex locomotive rod boring machine, disk grinders, universal milling machines, drill grinder, engine lathes, electric tool hardening furnace, electrically heated oil tempering furnace, gas-fired oven furnace, multiple spindle drilling machine, staybolt drilling machine, plate annealing furnace, upright drill, flange clamps, double-end punch and shear, plate bending rolls, portable electric arc welders, pneumatic flanging machine, flue shop equipment, single-frame steam hammers, bar shear, bulldozer, forging machine, forge blower, turret lathes, centering machines, horizontal punch, electric rivet heaters, die grinder, link grinder, Fox lathes, clamp press.

The Kansas City Southern Railroad, Kansas City, Mo., has preliminary plans in progress for the erection of new locomotive and car shops at Pittsburg, Kan., to consist of a number of buildings, including steel car shop, engine shop, power house, etc., estimated to cost in excess of \$1,000,000, including machinery.

The St. Louis Wire & Iron Co., 926 Chateau Avenue, St. Louis, has awarded a contract to George Moeller, 3520 Staska Avenue, for the erection of a two-story and basement addition, 50 x 150 ft., estimated to cost \$40,000.

The Common Council, Rich Hill, Mo., has approved a bond issue of \$20,000, the proceeds to be used for the purchase of new equipment for installation in the municipal electric power plant.

The Kansas City Power & Light Co., Kansas City, Mo., has arranged for a bond issue of \$21,000,000, a portion of the proceeds to be used for extensions and improvements. Work is now in progress for an increase in the capacity of the Northeast power plant from 60,000 to 90,000 kilowatts. Joseph F. Porter is president.

The Shaffer Refining Co., Cushing, Okla., has tentative plans under consideration for extensions and improvements in its oil refineries to cost about \$500,000, including equipment. It is proposed to install a new four-unit cracking plant.

The Norton Taxi-Cab Co., Joplin, Mo., has plans under way for the construction of a new two-story and basement automobile service and repair works, 100 x 155 ft., on Wall Street, for company cars.

The Wichita Sheet Metal Works, 2400 East Douglas Street, Wichita, Kan., is planning for the installation of new equipment at its plant, including power lathe, drill press, hand tools, etc.

The Nashville Bridge Co., Nashville, Tenn., has acquired property totaling about 14 acres of land at Bessemer, Ala., and has plans in progress for the erection of a new steel fabricating plant for structural shapes. The works will consist of a number of buildings, estimated to cost in excess of \$85,000, including equipment.

The Signal Mountain Mining Co., Chattanooga, Tenn., is planning for the development of extensive coal properties in the Suck Creek field, and will install electrical and other equipment, including hoisting machinery, conveying apparatus, etc. The project is estimated to cost close to \$200,000. L. S. Berg is secretary and general manager.

The Wichita Auto Spring Works, 141 South Washington Street, Wichita, Kan., is planning for the installation of additional equipment in its repair department, to be used both for automobile and wagon work. C. E. Rischel heads the company.

The Marland Refining Co., Ponca City, Okla., is perfecting plans for extensions in its local oil refinery to increase the capacity from 6000 bbls. of refined products per day to 14,000 bbls. A number of new plant units will be constructed, to include a large addition to the storage and distributing plant, with the installation of new steel tanks, pumping equipment, etc., to provide an ultimate capacity of 1,900,000 bbls. A new waterworks system, with electrically-operated pumping machinery, will be installed. The entire project is estimated to cost about \$1,500,000.

The Louisville Gas & Electric Co., 311 West Chestnut Street, Louisville, will commence the immediate erection of a new one-story cable house and works, 100 x 100 ft., with extension, 20 x 300 ft., on Washington Street, near Third Street, estimated to cost close to \$1,000,000, including equipment. Donald McDonald is president.

The Douglas Coal Mining Co., 504 Fourth and First National Bank Building, Nashville, Tenn., recently organized, is planning for the development of properties in the vicinity of Island, Ky., to include the installation of electrical machinery, hoisting equipment, mine cars and other mechanical apparatus for a daily capacity of about 400 tons. A. C. Lackel is president.

The Tennessee Power Co., Parksville, Tenn., has been granted permission by the State Public Utility Commission to issue bonds for \$250,000, the proceeds to be used for plant and system extensions and improvements.

The Common Council, Vinita, Okla., is planning for the construction of a municipal hydroelectric power plant on the Grand River. Work will be placed under way at an early date.

The Atkinson Armature Works, Pittsburg, Kan., has awarded a contract to the Helman Rogers Construction Co., Pittsburg, for the erection of a one-story and basement addition to its electrical equipment plant, 45 x 90 ft.

R. W. Parks, Wichita, Kan., operating a woodworking plant at 1832 South Wichita Street, is planning for the installation of new machinery, to include a saw, lathe, planer and other tools.

A vocational department will be installed in the new high school to be erected at Belle, Mo., estimated to cost close to \$100,000 with equipment.

The Gulf States

BIRMINGHAM, Sept. 18.

Bids will be received by M. T. Sharp, city clerk, Corinth, Miss., until Sept. 26, for the installation of a complete municipal electric light and power plant. Fuller & Beard, 616 Title Guarantee Building, St. Louis, Mo., are consulting engineers.

The Modern Truck Mfg. Co., P. O. Box 1589, Mobile, Ala., recently organized, has acquired the local plants of the Modern Welding & Blacksmithing Co. and the Marine Equipment Co. The plants will be remodeled and improved, and both used by the new owner for the manufacture of a special tubular steel hand truck, gearing and transmission equipment for lumber mill machinery and other kindred mechanical products. Additional equipment will be installed. G. M. Bryde is general manager.

The Hialeah Coach Co., Hialeah, Fla., has tentative plans under way for the erection of a new plant for the manufacture of six-wheel coaches and other vehicles and parts. John Thiel is general manager.

The Standard Electric Works, Montgomery, Ala., recently organized, has arranged for the establishment of a plant at 17 Bibb Street, for the rebuilding and repair of electric motors and other electrical equipment. The company is headed by G. T. Key, Jr., and W. J. Howard.

The Citizens Light & Power Co., New Orleans, La., has plans under way for the construction of an addition to its electric generating plant on Carrollton Avenue, estimated to cost about \$200,000, including machinery. H. K. Johnson is general manager.

The Common Council, Rayville, La., is planning for a bond issue of \$150,000, for the installation of a municipal electric light and power plant.

The Van de Graff Coal Co., Tuscaloosa, Ala., recently organized, has acquired the local properties of the Brookwood Coal Co., and plans for an increase in the present output of about 50 tons a day. New electrical and mechanical equipment will be installed, including motors, hoisting equipment, mine cars, etc. Hargrove Van de Graff is president and general manager.

The Hardaway Construction Co., Marianna, Fla., is planning for the erection of a new hydroelectric power plant on the Chipola River. Permission to use the site has been secured from the Federal Water Power Commission, Washington, D. C. The plant is estimated to cost in excess of \$100,000.

The Lone Star Gas Co., Dallas, Tex., is arranging a fund of about \$1,000,000 for extensions and improvements, including the construction of a new compressor plant, pipe lines, auxiliary stations, etc. Work will be placed under way at an early date.

Canada

TORONTO, ONT., Sept. 18.

INQUIRIES for machinery and machine tools are beginning to make their appearance in larger numbers and dealers are of the opinion that many of these now coming in will shortly turn into actual sales. The greater part of the present demand, however, is one or two machines or tools to a customer. Manufacturers are fairly active and the majority are now operating between 75 and 100 per cent of capacity. The slight improvement which recently made its appearance in the fuel market is helping to stimulate activity in practically all lines of industry and many of those concerns which were beginning to think that it would be necessary to curtail operations are becoming optimistic and as a result the demand for equipment for replacement purposes is beginning to strengthen. Inquiries from concerns with industrial plants under construction are leaving the impression that a considerable buying movement will shortly develop from this source. Several automobile concerns have plants underway for which no equipment has so far been purchased. Canadian railways are still holding back but it is the opinion among dealers and manufacturers that buying from these will shortly be resumed on a more extensive scale.

The Sturgis Baby Carriage Co., Ltd., 60 Sumach Street, Toronto, Ont., contemplates establishing a manufacturing plant at Brampton, Ont.

The Dodds Canadian Iron Works, Ltd., recently incorporated with a capital stock of \$200,000, will establish a plant at Welland, Ont., for the manufacture of flour mill machinery and equipment. The company has secured temporary quarters in the old M. Beatty & Son's plant there.

The Dominion Sheet Metal Corporation, Hamilton, Ont., is enlarging the capacity of its plant. When the addition is completed it will have capacity for 100 tons of galvanized sheets a day.

The Canadian By-Products Co., Ltd., Hamilton, Ont., has been incorporated with a capital stock of \$600,000, for the purpose of manufacturing fire brick. The company will erect a modern plant with a capacity of 20,000 fire brick and miscellaneous refractories per day. The officers of the company include: President, Wendell L. Whitehouse; vice-president, George W. Esslinger; secretary, Capt. Chauncey H. Derby; treasurer, Earl V. Wagner, all of Scranton, Pa. Directors include Ernest H. Darling, C. V. Langs and John C. Callaghan of Hamilton, Ont.

The British Empire Steel Corporation, Sydney, N. S., has announced that wage increases running from 10 to 15 per cent and affecting all classes of workers at the steel plant will become effective shortly. The rate paid for common labor is increased from 24½ and 26 cents per hour to 28 and 30 cents per hour.

IRON AND INDUSTRIAL STOCKS

Hesitancy in Stock Trading Owing to Uncertainties of Market

Conditions in steel movement have taken a new tack, the checking element now being the limit on shipment in place of the limit on production. Various embargoes between certain points virtually preclude shipment. There is great concern over the car shortage, which before long will mean a piling up of steel products at the source. Relatively little business was placed at the prevailing high prices, which are regarded as premiums for prompt delivery. An undertone of hesitancy dominates stock trading. Though appearances would point to a strong rising market, no actual advances of moment are noted. The week's turnover was light and, in most cases, if prices were shorn of quick delivery premiums, advances would be negligible. In many quarters there is strong expectancy of a revival on a lower, firmer basis after a few months shall have removed the cause of delivery premiums.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

	Low	High		Low	High
Allis-Chalm.	57 1/2	59 3/4	Gulf States Steel.	82 1/8	85 1/4
Allis-Chalm. pf.	101 1/4	103 1/2	Harbison Walker.	110	110
Am. B. S. & Fdry.	81 1/2	81 3/4	Inland Steel.	50	50
Am. B. S. & F. pf.	110	112	Int. Har. new.	110 3/4	113 1/2
Am. Can.	61 1/2	63 3/4	Lackawanna Steel.	79	82
Am. Can. pf.	109 1/2	110	Lima Loco.	62 3/4	64 1/2
Am. Car & F.	188	193	Midvale Steel.	31	35
Am. Car & F. pf.	122 1/2	125	Nat.-Acme.	15 3/4	16 3/4
Am. Loco.	122 3/8	127 3/4	Nat. E. & Stm.	61	62 3/4
Am. Loco. pf.	121	121 3/4	Nat. E. & Stm. pf.	102	103
Am. Radiator.	117 1/2	122	N. Y. Air Brake.	77	84
Am. Stl. F.	42 1/2	46 1/4	Nova Scotia Steel.	37 1/2	40
Am. Stl. F. pf.	106	106 1/2	Otis Steel.	10 3/4	11 1/4
Bald. Loco.	135 1/2	140 3/8	Pittsburgh Stl. pf.	97	97
Bald. Loco. pf.	114	115	Pressed Stl. Car.	89 3/4	95 1/4
Beth. Steel.	76	77 3/4	Pressed Steel.	104	106
Beth. Stl. Cl. B.	77 3/4	79 3/8	Ry. Steel Spring.	119 3/4	126 1/4
Beth. St. 8% pf.	114 3/4	115 1/2	Ry. Stl. Spring pf.	115	115
Brier Hill. pf.	19	19	Replogle Steel.	32 3/4	35
Br. Em. Steel.	12 3/4	14 1/2	Republic.	69 1/4	71 3/4
Br. Em. S. 1st pf.	74 3/4	75	Republic pf.	92 3/4	92 3/4
Br. Em. S. 2d pf.	36 1/2	39	Sloss.	49 1/2	51 1/2
Cambria Steel.	90	90	Sloss pf.	78 3/4	78 3/4
Chic. Pneu. Tool.	80 3/4	87	Steel of Canada.	77 1/4	80
Colo. Fuel & Iron.	32 1/2	36 3/4	Superior Steel.	33	34 1/4
Crucible Steel.	92	96 3/4	Superior S. 1st pf.	90	91
Crucible Steel pf.	95 1/2	99	Un. Alloy Steel.	37	38 1/4
Deere. pf.	76 3/4	76 3/4	U. S. Steel.	104 1/2	106 3/4
Dom. Steel.	40	40	U. S. Steel pf.	121 1/2	122 3/4
Gen. Electric.	179	183	Vanadium Steel.	51	53
Gt. No. Ore Cert.	40 3/4	42	Whouse Air Br.	102	104

Industrial Finance

At the annual stockholders' meeting of the Vanadium Corporation of America J. Leonard Replogle, chairman of the board, stated that the August earnings will be in excess of \$90,000 net after all charges. Vanadium's current liabilities approximate \$40,000, while quick assets are around \$3,600,000, roughly 90 times its liabilities.

The Associated Motor Industries, a merger comprising eight motor and machine manufacturers, in its first balance sheet, as of July 15, showed total assets of \$20,254,031, of which \$9,564,555 were current and \$10,135,378 represented land, buildings and equipment less depreciation. Current liabilities aggregate \$1,210,060, which with \$2,000,000 first mortgage bonds, \$3,542,138 notes and dealers' deposits, \$75,000 for reserve and \$12,426,822 capital liabilities and surplus, made total liabilities \$20,054,021.

Directors of the Youngstown Sheet & Tube Co., Youngstown, last week increased its common dividend from 50c. to 75c., owing to improved earnings. At the same time the regular preferred dividend of \$1.75 per share was authorized. Both payments are due on Oct. 1 to stock of record Sept. 20. Since July 1, 1921, the company has been paying 50c. per share quarterly on its common stock. From the standpoint of earnings, June was the best month of the year for the company, and the third quarter showed a substantial gain both in gross and net earnings over the second quarter.

Directors of the Newton Steel Co., Youngstown, Ohio, have declared the regular quarterly dividends of \$1.50 per share on common and \$1.75 on preferred, both payable Oct. 1 to holders of record Sept. 20.

The Auto Accessory & Repair Co., 405 West Monument Street, Baltimore, Md., has been incorporated with a capital of \$20,000, to manufacture automobile equipment and operate a general machine repair works. At present it is doing only garage work, specializing in auto brake relining under the Raybestos Co. The incorporators are A. C. and G. E. Hull and J. W. B. Ballinger.

Plans of New Companies

The Hendry Machine & Engineering Co., Fort Myers, Fla., was recently incorporated with a capital stock of \$50,000, to manufacture iron and steel products. Its buildings are complete, but it will be in the market for machinery. B. L. Hendry is president, L. Hendry vice-president and W. F. Lusk secretary, all of Fort Myers.

The Bronze Hardware Mfg. Co., Buffalo, N. Y., has been incorporated with a capital of \$100,000, to manufacture hardware products. It will manufacture its own products. Sufficient equipment has been purchased to start operations. The incorporators are: W. H. and E. K. Barlow and W. O. Kuhn. D. E. Hart, attorney, Buffalo, represents the company.

The Universal Darning Machinery Corporation, 30 Church Street, New York, was recently incorporated with a capital of \$500,000, to manufacture textile machinery and parts. Tentatively, it will lease a plant, preferably in Brooklyn, but expects to erect its own buildings as soon as operations are well under way. It is in the market for its entire equipment. The incorporators are S. Sims and C. M. Fyfe.

The Hartford Valve Mfg. Co., Hartford, Conn., has been incorporated with a capital of \$50,000, to manufacture valves and kindred engineering specialties. Arrangements have been made for manufacturing a flush valve which has previously been made by the M. S. Little Mfg. Co. The incorporators are H. B. Carey, M. S. Little and M. H. Flynn, 113 Whitney Street, Hartford, Conn.

The Amplex Engineering Corporation, 52 Vanderbilt Avenue, New York, recently organized, has leased a plant and has purchased part of the necessary equipment. It is still receiving bids on the rest. This company was incorporated with a capital of \$100,000, to manufacture packing wire baling and other mechanical specialties. The officers are: N. M. Goodlett, president; J. A. Rietmann, vice-president, and E. Palmer, secretary-treasurer.

The Open-Hearth Fire Brick Co., Wilmington, Del., has been incorporated with a capital stock of \$500,000, to manufacture fire brick and other refractories. It expects to erect a plant and will be in the market for equipment. The company has over 1000 acres of upper Freeport coal seam, having taken over the plant formerly operated by W. A. McCreary, Freeport, Pa. Sleeves, nozzles, runner brick and silica brick will be the chief products. H. O. Williams, 1407 Keenan Building, Pittsburgh, is the corporate representative.

The Sutwa Mfg. Co., 17 West Forty-second Street, New York, has been incorporated with a capital of \$100,000, to manufacture hangers and other metal products. For the present its manufacturing will be contracted for, but later it may put up a plant of its own. The incorporators are M. G. Newman, D. M. Meyers and C. Weil.

The Hydraulic Elevator & Machine Co., New York, was recently incorporated with a capital of \$25,000, to manufacture hydraulic elevator equipment and parts. Its manufacturing will be done by the Thurber Elevator Co. The incorporators are J. O'Rourke, J. F. Higgins and M. Butler. Dooling & Waldman, 141 Broadway, New York, represent the new company.

The Henry Forge & Tool Co., Inc., Auburn, N. Y., has been incorporated with a capital stock of \$200,000, to manufacture tools and machinery. It will specialize in drop forgings and machined parts for all purposes. Contracts have been awarded and the buildings are under construction. A large portion of the equipment has been purchased. The management expects to be in operation Jan. 1, next. W. J. Henry is president; W. M. Henry, vice-president and treasurer, and F. A. Henry, secretary.

The Plate Glass Machine Co., Butler, Pa., was recently incorporated to manufacture glass making machinery and parts. All its work is to be done by contract. F. E. Troutman, Butler, Pa., is treasurer.

The Universal Burner Co., manufacturer of liquid fuel burning equipment, Logansport, Ind., recently incorporated under the laws of Indiana at \$25,000, all common stock, expects to build all of its equipment with the exception of large air compressors and steam pumps, which it will purchase on the market. It will also purchase motors for use in connection with small units and motor-driven oil pumps. The company is manufacturing oil burners for all industrial uses. It has a staff of engineers and has designed a burner eliminating the use of all needle valves and controlling the oil with a self-cleaning valve which will permit the use of the heavier grades of fuel oil without clogging. By the arrangement of a cone on the end of the valve, both mechanical and air atomizing is applied to the fuel, assuring complete combustion of the oil within the furnace.

ZINC COATING ON SHEETS*

Method for Determining the Amount by Measuring the Rise in Temperature of the Acid Employed

THIS paper describes a new method for the determination of spelter coating on iron and steel sheets, the value of the method lying in the fact that coating weights can be determined without the use of the analytical balance. A galvanized specimen is immersed in a measured amount of acid, the maximum temperature rise being recorded. Each one-tenth degree rise in temperature is equivalent to a definite weight of zinc.

Apparatus and Manipulation

The equipment needed consists of a ground-stoppered bottle containing concentrated hydrochloric acid, a graduated volumetric flask used to measure the acid, a testing jar, and a thermometer. Providing the sides and bottom are not too thick, almost any container would be satisfactory. The size of the jar should be approximately 2½ in. in diameter. An elliptical shaped container is very advantageous, as will be pointed out hereafter. The thermometer is the only precision instrument needed, being, in fact, the only item of apparatus which is in any way costly. It should be graduated in tenths of a deg. C. with a range of, perhaps, 50 deg. (90 deg. Fahr.)

A measured amount of concentrated hydrochloric acid is poured into the testing jar. The base metal may be slightly attacked without danger to accuracy, consequently, it is not necessary to add antimony trichloride to the acid. The volume of the acid chosen regulates the conversion factor, that is, the value in grams for each 0.1 deg. C. rise in temperature. The smaller the volume of acid used the greater will be the rise in temperature for each gram of zinc dissolved. Several series of experiments were run using volumes of acid which varied in amounts from 100 to 300 cc. and, although the conversion factor was different for each volume used, nevertheless the coating weight was accurately determined regardless of the acid volume employed. It must be pointed out, however, that when an exceptionally high coating weight is determined (3 or 4 oz. per sq. ft.) the acid volume for the usual size of specimen should never be less than 300 cc. The shape of the testing jar regulates to some extent the volume of acid needed. It is obvious that sufficient acid must be present to insure complete immersion of the sample. A smaller volume of acid can be used for the same height test piece if the tumbler is elliptical in shape rather than circular.

Other Shapes of Containers

Experiments were also conducted using a container rectangular in shape. Very close checks were obtained using all the various shaped containers mentioned. The height of the container is not important except that it must be at least of such height that no acid bubbles out at the moment the evolved gas causes the liquid to rise.

After the acid is poured into the container it is stirred thoroughly to insure an equalized temperature. The thermometer is immersed in the liquid, and when the temperature is constant the reading is recorded. The galvanized specimen is immersed in the acid (the spelter coating dissolving very rapidly), the heat evolved being absorbed by the acid. The action is so rapid that the spelter is dissolved and the maximum temperature reached in about 30 or 40 sec.; consequently, radiation does not interfere with accuracy. The maximum temperature is then recorded. The rise in temperature multiplied by an experimental conversion factor gives the grams of zinc originally carried by the test piece. The entire time required for a deter-

mination is very short, the entire operation being finished in 3 min. or less.

Samples and Experimental Data

The samples used must be clean. For this reason it is customary to wash them off with gasoline. The size of the sample is immaterial except that it must not be too large for the testing jar. Since the coating weight is customarily reported in ounces per square foot, a 2¼ by 2¼-in. test piece has been found convenient, as the weight of zinc in grams is then numerically equal to the ounces per square foot desired. When only irregularly shaped pieces are available, it is advantageous to use a planimeter for accurately measuring surface areas. The sample is placed on a sheet of plain white paper and a pencil run around the edge. The area of this figure, which is the area of the test piece, may then be read directly by means of the planimeter. The area obtained may be compared to the area of a 2¼ by 2¼-in. specimen (5.06 sq. in.) and the ounces per square foot calculated by proportion.

The table contains experimental data which shows the accuracy of the temperature rise method. The determinations obtained by the temperature rise method are compared with results obtained by the hydrochloric acid method. These comparative figures are all the more interesting because they are absolute comparisons. Each sample was weighed before the coating weight was determined by the temperature rise method. When the temperature was recorded the sample was dried and re-weighed, the difference in weight giving the coating weight by the hydrochloric acid method. The same sample was thus used for both determinations.

Table of Experimental Data on Temperature Rise Method of Coating Determination

Material	Size, In.	Gage No.	Vol. of Acid Used, cu. cm.	Conversion Factor for Volume Used	Temperature Rise, Deg. C.	Grams of Zinc by Temperature Method	Grams of Zinc by HCl Method	Difference
Galvanized iron.....	2 x 2	14	100	0.168	11.0	1.85	1.85	0.00
Galvanized iron.....	2 x 2	14	100	0.168	12.1	2.03	2.02	0.01
Galvanized iron.....	2 x 2	10	100	0.168	12.0	2.02	1.98	0.04
Galvanized iron.....	2 x 2	16	100	0.168	8.4	1.41	1.42	0.01
Galvanized iron.....	2 1/2 x 2 1/2	28	100	0.168	5.2	0.87	0.88	0.01
5 nails, electro galvanized.....	..	120	0.191	3.0	0.57	0.60	0.60	0.03
10 nails, electro galvanized.....	..	120	0.191	5.5	1.05	1.10	1.05	0.05
5 nails, hot-dip galvanized.....	..	120	0.191	13.0	2.48	2.43	2.43	0.05
10 nails, hot-dip galvanized.....	..	120	0.191	24.0	4.58	4.62	4.62	0.04
Metallic zinc sawings.....	..	120	0.191	3.5	0.67	0.70	0.70	0.03
Metallic zinc sheet.....	..	120	0.191	9.0	1.72	1.70	1.70	0.02
Metallic zinc sawings.....	..	120	0.191	9.0	1.72	1.70	1.70	0.02
Metallic zinc sheet.....	..	120	0.191	25.0	4.77	4.71	4.71	0.06
Galvanized iron.....	2 x 3	26	120	0.191	10.5	2.01	2.02	0.02
Galvanized steel.....	2 x 3	26	120	0.191	9.5	1.81	1.82	0.01
Galvanized steel.....	2 x 3	26	120	0.191	8.5	1.62	1.68	0.06
Galvanized steel.....	2 x 2	16	120	0.191	8.0	1.53	1.52	0.01
Galvanized steel.....	2 x 2	16	120	0.191	7.0	1.34	1.34	0.00
Galvanized iron.....	2 x 2	16	120	0.191	11.0	2.10	2.06	0.04
Galvanized iron.....	2 x 2	16	120	0.191	12.0	2.29	2.27	0.02
Galvanized iron.....	irregular	20	120	0.191	8.3	1.50	1.61	0.02
Galvanized iron.....	2 1/2 x 2 1/2	12	120	0.191	15.0	2.87	2.88	0.01
Galvanized steel.....	2 1/2 x 2 1/2	16	200	0.305	4.1	1.25	1.28	0.03
Galvanized steel.....	2 1/2 x 2 1/2	24	200	0.305	3.9	1.19	1.23	0.04
Galvanized steel.....	2 1/2 x 2 1/2	24	200	0.305	4.1	1.25	1.26	0.01
Galvanized steel.....	2 1/2 x 2 1/2	24	200	0.305	4.2	1.28	1.29	0.01
Galvanized steel.....	2 x 2	24	200	0.305	6.7	2.04	2.04	0.00
Galvanized iron.....	2 x 2	20	200	0.305	7.3	2.23	2.23	0.00
Galvanized iron.....	2 x 2	20	200	0.305	7.2	2.20	2.20	0.00
6 rivets.....	..	..	200	0.305	1.3	0.40	0.41	0.01
Galvanized iron.....	2 1/2 x 2 1/2	10	300	0.425	10.1	4.29	4.25	0.04
Galvanized iron.....	2 1/2 x 2 1/2	10	300	0.425	12.3	5.22	5.20	0.08

J. A. Aupperle, "The Determination of Spelter Coating on Sheets and Wires," *Proceedings, Am. Soc. Test. Mats.*, Vol. XV, Part II, p. 120 (1915).

Application to Other Products

The application of the method is not limited to sheet metal alone, but can be used equally as well for rivets, nails, wire or anything in fact which carries a coating weight and on which the surface area can be determined.

The temperature rise method of coating determination is very serviceable for field tests. The equipment needed can easily be packed in a small box and carried from place to place. The testing jar and the thermometer take the place of the analytical balance. To test a sample in the field it is only necessary to clip a piece from the sheet to be tested and drop it in the acid, after which the temperature rise is recorded.

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Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipments in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	
Refined iron bars, base price	2.94c.
Swedish bars, base price	7.00c.
Soft steel bars, base price	2.94c.
Hoops, base price	4.29c.
Bands, base price	3.74c.
Beams and channels, angles and tees	
3 in. x 1/4 in. and larger, base	3.04c.
Channels, angles and tees under 3 in. x 1/4 in., base	2.94c.

Merchant Steel

	Per Lb.
Tire, 1 1/2 x 1/2 in. and larger	2.94c.
(Smooth finish, 1 to 2 1/2 x 1/4 in. and larger) ..	3.14c.
Toe-calk, 1/2 x 3/8 in. and larger	4.00c.
Cold-rolled strip, soft and quarter hard ..	6.75c. to 7.25c.
Open-hearth spring steel	4.50c. to 7.00c.
Shafting and Screw Stock:	
Rounds	3.90c.
Squares, flats and hex	4.40c.
Standard cast steel, base price	15.00c.
Extra cast steel	18.00c.
Special cast steel	23.00c.

Tank Plates—Steel

1/4 in. and heavier	3.04c.
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Sheets

Blue Annealed

	Per Lb.
No. 10	4.04c. to 4.19c.
No. 12	4.09c. to 4.24c.
No. 14	4.14c. to 4.29c.
No. 16	4.24c. to 4.39c.

Box Annealed—Black

	Soft Steel C. R., One Pass, Per Lb.	Blued Stove Pipe Sheet, Per Lb.
Nos. 18 to 20	4.30c. to 4.70c.	.....
Nos. 22 and 24	4.35c. to 4.75c.	5.00c.
No. 26	4.40c. to 4.80c.	5.05c.
No. 28	4.50c. to 4.90c.	5.15c.
No. 30	4.75c. to 5.15c.	.....
No. 28 and lighter, 36 in. wide, 10c. higher		

Galvanized

	Per Lb.
No. 14	4.60c. to 5.00c.
No. 16	4.75c. to 5.15c.
Nos. 18 and 20	4.90c. to 5.30c.
Nos. 22 and 24	5.05c. to 5.45c.
No. 26	5.20c. to 5.60c.
No. 27	5.35c. to 5.75c.
No. 28	5.50c. to 5.90c.
No. 30	6.00c. to 6.40c.
No. 28 and lighter, 36 in. wide, 20c. higher.	

Welded Pipe

Standard Steel

	Black	Galv.
1/2 in. Butt ..	—53	—38
3/4 in. Butt ..	—58	—45
1-3 in. Butt ..	—60	—47
2 1/2-6 in. Lap ..	—57	—44
7-8 in. Lap ..	—53	—30
9-12 in. Lap ..	—49	—30

Wrought Iron

	Black	Galv.
1/2 in. Butt ..	—16	+2
1 1/2 in. Butt ..	—19	—1
2 in. Lap ..	—13	+4
2 1/2-6 in. Lap ..	—16	+1
7-12 in. Lap ..	—8	+8

Steel Wire

BASE PRICE* ON NO. 9 GAGE AND COARSER Per Lb.

Bright basic	4.00c. to 4.25c.
Annealed soft	4.00c. to 4.25c.
Galvanized annealed	4.65c. to 4.90c.
Coppered basic	4.65c. to 4.90c.
Tinned soft Bessemer	5.65c. to 5.90c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	19 1/4 c. to 20 1/4 c.
High brass wire	20 1/4 c. to 20 3/4 c.
Brass rod	16 1/4 c. to 17 1/4 c.
Brass tube, brazed	26 1/4 c. to 27 1/4 c.
Brass tube, seamless	23 c. to 23 1/2 c.
Copper tube, seamless	25 1/4 c. to 26 c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 22 1/4 c. to 23 3/4 c. per lb. base.
Cold rolled, 14 oz. and heavier, 3c. per lb. advance over hot rolled.

Tin Plates

Bright Tin	Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20	Coke—14-20	Primes	Wasters
IC ..	\$10.00	\$8.50	80 lb.	\$6.05	\$5.80
IX ..	11.50	10.00	90 lb.	6.15	5.90
IXX ..	13.00	11.25	100 lb.	6.25	6.00
IXXX ..	14.25	12.50	IC ..	6.40	6.15
IXXXX ..	16.00	14.00	IX ..	7.40	7.15
			IXX ..	8.40	8.15
			IXXX ..	9.40	9.15
			IXXXX ..	10.40	10.15

Terne Plates

8-lb. coating, 14 x 20

100 lb.	\$7.00
IC	7.25
IX	7.50
Fire door stock	9.00

Tin

Straits, pig	36c.
Bar	43c. to 47c.

Copper

Lake ingot	15 1/4 c.
Electrolytic	15 c.
Casting	14 3/4 c.

Spelter and Sheet Zinc

Western spelter	8 1/2 c.
Sheet zinc, No. 9 base, casks	9 1/4 c. open 9 1/4 c.

Lead and Solder*

American pig lead	6 3/4 c. to 7c.
Bar lead	8c. to 8 1/2 c.
Solder, 1/2 and 1/2 guaranteed	25c.
No. 1 solder	23 1/2 c.
Refined solder	20 1/4 c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	75c.
Commercial grade, per lb.	35c.
Grade D, per lb.	25c.

Antimony

Asiatic	7c. to 8c.
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Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	25c. to 27c.
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Old Metals

Trading is quiet but the market is strong. Dealers' buying prices are as follows:

	Cents Per Lb.
Copper, heavy crucible	11.75
Copper, heavy wire	11.25
Copper, light and bottoms	9.25
Brass, heavy	6.25
Brass, light	5.25
Heavy machine composition	8.50
No. 1 yellow brass turnings	6.50
No. 1 red brass or composition turnings	8.00
Lead, heavy	4.50
Lead, tea	3.50
Zinc	3.25

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